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INTELLIGENCE EXAMINATIONS FOR COLLEGE ENTRANCE[1]

EDWARD L. THORNDIKE
Teachers College, Columbia University

For an ideal examination of the intelligence of candidates for college entrance we might set the following specifications:

I. *Significance.*—The score should correlate as closely with future achievement in college as is possible. This maximum possible correlation will not be 1.00, since achievement in college is due in part to health, to freedom from personal worries, and to various moral qualities as well as to intellect. Also, the magnitude of the correlation coefficient will depend on the range of the intellect of candidates, being smaller as that range is restricted. If all the eighteen-year-olds in the country were educated for college, tested, and given a trial in college, we might perhaps expect a maximum correlation as high as 0.75 to 0.85. Within the restricted range of those who complete a high-school course and actually become candidates, we may expect as a maximum 0.55 to 0.65, possibly more. A correlation above 0.50 is probably an improvement over the attainment of standard systems of accrediting high schools or of entrance to college by examination in school subjects.

II. *Continued significance.*—The correlation should maintain itself year after year after the nature of the intelligence examination is known in spite of whatever coaching candidates undertake. This implies, in theory, that such

[1] A paper prepared for presentation before the National Association of Directors of Educational Research at its meeting at Cleveland, Ohio, February 26, 1920.

special coaching shall give training that is nearly as useful for future college achievement as for success in the test, or that the tendency to undertake, and the ability to profit by such special coaching shall be very closely correlated with ability to achieve in college. In practice, it means that the examinations year after year should be totally different in content until a great many of them are available; and should differ in form where there is danger that adaptation to the form of the examination may enable a dull boy to secure a good score.

III. *Comparability of standards and results.*—(a) The examinations given year after year should be closely equal in difficulty; (b) the scoring should be by standard keys so that the same paper scored by different examiners will receive substantially the same score; (c) the administration of the examination should be simple and independent of the personality of the examiner.

IV. *Probable error of the examination itself.*—For the examination's main purpose, the probable error is already taken account of in the correlations with college success. For that purpose, in fact, a large probable error would be encouraging, for it would mean that by repeating the examination, using a different form, the correlation with college success could be notably raised. For certain special purposes such as comparing individuals or groups, and for the justification of shortened forms of the examination, the smaller the probable error the better.

A half-year's experience with the Thorndike Intelligence Examination for High School Graduates may increase our confidence that these specifications may be met to a rather close approximation. This examination was devised at the request of the faculty of Columbia College, where it is an optional means of entrance for boys suitably recommended. Three forms of it have been used to date by Columbia, one in June 1919, one in September 1919, and one in February 1920. About seven hundred candidates have taken it, though over half of these were already legally admitted by the content examinations of Columbia University or the College Entrance Examination Board or the New York Regents. It has also been used for various purposes by a number of other institutions.

Significance

Four years must elapse before an exact accounting on this point can be made, but the following facts may be noted:

Of eleven boys at Columbia, reported to the dean's office for inability to do college work in the early weeks of the year, all had notably low scores in the intelligence examination. Of a score or more so reported as a result of the mid-term records, all but two had low scores. The defective college work of these two was by common consent not due to intellectual defect.

In the case of a group of eighty odd candidates in another college, the correlation between the score in the Thorndike examination and the first term's college record was over 0.65. The highest 40 percent in the examination showed 74 percent of high grades in college work and 26 percent of low grades. The lowest 60 percent in the examination showed 27 percent of high grades and 73 percent of low grades. Of the 16 percent receiving the lowest grades in the examination, none received any college grade above C and 86 percent failed in five hours or more of their college work

In a third institution, where the entire student body was tested, the members of the three upper classes showed no scores below 60 in the examination, whereas a third of the freshmen (admitted by certificate) scored below 60. The distributions given in the accompanying table (Table I) give a correlation of approximately 0.55 between test score and continuance beyond the freshman year. The returns received from the first and third of these institutions are a random selection from trials of the examination. Those from the second institution were reported to the writer. They may have been reported because of the positive evidence of the success of the examination, and so may be unduly favorable.

Continued Significance

If we take the best of the test material that has demonstrated high correlations, such as selected series of opposites, mixed relations, and cleverly devised problems and completions, and give it without fore-exercise, we can undoubtedly get high correlations, but we may be unable to maintain them.

Our opposites, relations, and problems of later years will probably not be so ingenious as those which we chose first. Moreover, part of the first high correlation may have been due to the testing

TABLE I. THE SCORES, IN PERCENTAGES, OF STUDENTS IN A WESTERN PROFESSIONAL SCHOOL IN THE THORNDIKE INTELLIGENCE EXAMINATION FOR HIGH SCHOOL GRADUATES

(This institution admits on certificate from accredited schools but finds that a considerable percentage of the students so admitted do not satisfy its standards, the elimination being rather large. The figures below show that apparently an ability denoted by a score of 60 or more in the Thorndike examination is required for meeting the standards of this institution. None of the sophomores, juniors, and seniors fall below 60, whereas about one-third of the freshmen do.)

Score in Thorndike Examination	Freshmen Percent	Sophomore Junior Senior Percent
30	2.6	.....
35	2.6	.....
40	12.9	.....
45	2.6	.....
50	2.6	.....
55	10.3	.....
60	15.4	5.5
65	10.3	16.3
70	12.9	10.9
75	5.1	8.1
80	7.7	19.0
85	10.3	10.9
90	7.7	8.1
95	.....	10.9
100	.....	8.1
105	.....	0
110	.....	0
115	.....	2.7

of ability to understand quickly the nature of the tasks. When the nature of the examination becomes a matter of public knowledge to candidates, the best features of it may be lost. It will be specially disastrous if some candidates do and others do not know about it.

Consequently, thorough precautions must be taken so that the examination will be as effective for twenty years as it is in its first trials. Our precautions are:

1. All test material is made up in quantities sufficient to provide for the entire series of examinations into which it enters, and is distributed without prejudice among them.[2] The selection for September 1929 will be nowise inferior to the selection for September 1919.

2. Three-fourths of the candidates' time is spent on paragraph reading, completing sentences, tests of information, arithmetical and algebraic computations and problem solving, common-sense questions, and following directions. The nature of these tasks is understood in a second or two by everybody of the intelligence level of a high-school graduate. In examining hundreds of papers, I have never seen a case of misunderstanding a single one of these tasks.

3. With two exceptions,[3] fore-exercise is given for the other tasks, and two trials at each task are allowed. They include such tests as the disarranged sentences, opposites, number-series completions, verbal analogies, pictorial analogies, geometrical relations, and absurdities. The nature of these is, in general, such that any unfair advantage to a boy whom some unscrupulous tutor might train in test-taking would be slight. Experiments are planned to measure this gain exactly. If it is appreciable, the examination will be extended to include "traps" to penalize such improper preparation.

4. The content of the examination is entirely different in each issue. The form of the examination in the case of those tests where an unfair advantage from coaching is a possibility, will change every two or three years.

5. Finally, no new issue will be used regularly until it has been tried out sufficiently to insure its giving a prophecy substantially equivalent to the previous issues of the examination.

Comparability of Standards and Results

Since each element of the examination is selected at random as to difficulty, the total examination, comprising over twenty different tests, will in any one issue of the same general type, be closely equal in difficulty to any other (with the exception of the

[2] This is not true of the June 1919 series, which had to be arranged in part before the total material could be planned.

[3] In the later series it is planned to provide fore-exercise for these, if any evidence appears that it is needed to equalize matters for those who have and those who have not previous acquaintance with the examination.

June, 1919 series which, for the reason given above, could not be fully standardized and is in part somewhat harder than the others). Each issue is further checked in this regard by actual trial. For example:

Eighty college students took Forms A and F, Part I, of the examination in that order. Eighty others took Forms A and G in that order. Letting a = score in A, f = score in F, and so on, we find that Median of (f − a) = Median of (g − a) + 1. That is, Form G is 1 point, or less than 1%, harder than Form F.

Thirty-six college students took Forms A and H in that order. Median of (h − a) = Median of (f − a) + 1½. That is, Form F is 1½ points, or a little over 1%, harder than Form H.

One hundred fifty-four college students took Forms A and J in that order. Median of (j − a) = Median of (f − a) + 2. That is, Form F is 2 points, or about 1⅓% harder than Form J.

Thus f = g + 1 = h − 1½ = j − 2

Part II Form B and Part II Form C were each given to 85 college students, the two groups of 85 being random halves of a group of 170. The two groups were tested at the same time in the same room, by the same examiner, all instructions being identical. The median score for Form B was 81.5; for Form C, 79.0 or a difference of 2.5. The 25-percentile score for Form B was 58.3; for Form C 57.5 or a difference of −0.8. The 75-percentile score for Form B was 102.7; for Form C 101.9 or a difference of −0.8. In general, the two distributions are closely similar.

We may, therefore, conclude that Part II C is probably a trifle harder than Part II B (about 1½ percent).[4]

Thirty-three college students took both III B and III C, sixteen having one form first and seventeen having the other form first. The median of (c − b) = 1½ points or about 2½ percent.

Two examinations made up respectively of:

I G	I J	II B	and III B
I F	I H	II C	and III C

would thus be almost exactly equal in difficulty for a college group.

Twenty-three adults took both II B and II D, twelve having Form B first and eleven having Form D first. The median of (b − d) = 4. That is, Form D is 4 points harder than Form B.

[4] Test 7 was omitted in both cases, but we know from other evidence that II B 7 and II C 7 are very closely similar in difficulty.

So, when II D is used in place of II B or II C, the other parts of the examination should be chosen to be a trifle easier than I G, I J, III B, or I F, I H, III C.

The difference in difficulty between any two issues can thus be known and allowed for by transmuting the score, or, if it is at all large, it can be reduced by alterations in the examination and rechecking. This process of equalization can be applied to the 10-percentile or 20-percentile or any other ability levels as well as to the general tendency of the group.

This checking is extremely laborious and probably unnecessary, since differences of 3 and 4 or even of 5 and 6 percent in the difficulty of different issues are of little practical consequence in any uses to which the examination is likely to be put. However, their reduction to small amounts and an exact knowledge of these amounts make an instrument available for very precise comparisons.

The scoring of all save the reading and completion tests is, with very slight exceptions, done by absolute keys with no requirement of judgment on the part of the scorer. The scoring of the reading and completion tests requires some judgment in the use of the keys, but the correlation between the ratings given by two scorers of the ability of a college instructor or assistant is very high. The correlation between two such scorers is 0.98. The probable difference between two such scorers was found to be only five points out of a total score which ranges from 7 to 96 among the actual candidates whose papers were scored. These scorers used only the stock keys supplied with the tests. By having one person score one test of the six, another score another, and so on, the probable error for the total result of one such group of six would obviously be unappreciable. This is the practice recommended where the examination is used with groups of any considerable size.

The administration of the examination consists simply of giving out the blanks, and instructing the candidates to go ahead at certain times even if they have not finished the work to date. In general, a candidate does test after test without awaiting instructions.

Improvement of the Examination

As soon as adequate records of success in college are available, the correlation of each element of the examination therewith will

be computed together with the partial correlations where these are instructive. In the meantime, data are being gathered concerning the value of different available tests as shown by their correlations with a composite score obtained in seven or eight hours of work by adults of the general intelligence level of college candidates. Some of the data so far obtained are of value to anybody who is working with group tests for adult intelligence, and are presented here. Lack of space forbids adequate description of the tests. The following definitions apply to captions appearing in Tables II and III.

1. "Part I (first half)" means the first 30 minutes work of the standard examination as now given.
2. "Part II" means Part II of the standard examination.
3. "Part III" means Part III of the standard examination.
4. "New Part I (first half)" means a new form of Part I to go into effect in 1922.
5. "Information" means a test of the type used in the Army Alpha, but harder.
6. "Name part" means a test in writing a word that means a part of the thing named by the given word, and also begins with a certain letter.
7. "Name opposite" means a test in writing a word that means the opposite of the given word, and also begins with a certain letter.
8. "Name thing of which is part" means a test in writing a word meaning something of which the thing named by the given word is a part. The word written must also begin with a certain letter.
9. "Name thing made of," "synonyms" and "species of genus" are like the above. The word written has to fulfill the requirement of being in the stated relation to the given word and also of beginning with a certain letter.
10. "Sum, difference, product" means a test in giving two numbers which are defined by certain relations (e.g. two numbers whose product is 1 and whose sum is 2).

TABLE II. CORRELATIONS OF VARIOUS FORMS OF GROUP TESTS OF ADULT INTELLIGENCE LEVEL WITH A COMPOSITE SCORE FOR SEVEN HOURS OF TEST WORK, IN THE CASE OF 33 COLLEGE STUDENTS

Test	Time in Minutes	Correlation
Part I (first half)	30	0.75
Part II	60	0.85
Part III	40	0.65
Part III	120	0.81
New Part I (first half)	30	0.84
Information	15	0.62
Name part	8	0.40
Name opposite	12	0.80
Name thing of which is part	13	0.72
Name thing made of	13½	0.61
Synonyms	16	0.66
Species of genus	12½	0.61
Sum, difference, product	20	0.83
Total Time	390	

TABLE III. INTERCORRELATIONS OF VARIOUS FORMS OF GROUP TESTS FOR ADULT INTELLIGENCE LEVELS 33 COLLEGE STUDENTS

	Name Part	Name Opposite	Thing of Which Is Part	Thing Made of	Synonyms	Species of Genus
Information	0.03	0.56	0.53	0.54	0.48	0.52
Name part	.....	0.25	0.27	0.30	0.30	0.33
Name opposite	.....	.....	0.61	0.46	0.83	0.49
Thing of which part	.....	.....	.....	0.49	0.64	0.39
Thing made of	.....	.....	.....	.....	0.49	0.55
Synonyms	.....	.....	.....	.....	.....	0.21

Facts like those shown in Tables II and III are being collected from individuals of the intelligence level of college students as fast as time and facilities permit, so that no test need ever be used in the examination until its value has been demonstrated.

A NEW METHOD OF RATING TEACHERS

WILLIAM L. CONNOR[1]
Superintendent of Schools, Republic, Michigan

It is the teacher's task to make changes for the better in the abilities, habits, and attitudes of boys and girls. Her efficiency can be evaluated fairly only in terms of her success at this task. In other words, if a teacher is rated at all, she should be rated, not by the clothes she wears, or the method she chooses, but by the results she secures.

The rating card here proposed, together with the lists of "concrete acts" and suggestions for use, constitutes a scheme for rating teachers according to the results they secure with boys and girls. It is not a perfect plan; but it has proved more satisfactory to teachers than the usual type of rating scheme in which personal qualities, training, discipline, attention to equipment, etc., take equal rank with the results secured. The studies reported in this paper were made by persons in both supervisory and teaching positions, who were trying to make a "promotion by merit" scheme work. They believe they have evolved a way of rating the efficiency of teaching which is better than any scheme in common use, but realize it is still vastly short of the "dream of the scientist in education" of which Coffman speaks:[2] a scale for measuring the efficiency of teaching.

The stimulus to the evolution of the new rating scheme was the adoption by the board of education of Republic, in the fall of 1916, of a resolution creating a uniform basal salary of $550.00 a year for the grades and $750.00 for the high school, and also empowering the superintendent to rate the efficiency of each teacher as a basis for determining additional compensation ranging from $25.00 to $75.00 a year. These figures were later increased to $650.00 and $850.00 per year and the range of the bonuses from $50.00 to $150.00.

[1] The author appreciates and desires to acknowledge the assistance given by teachers, and others including the editors, of the JOURNAL OF EDUCATIONAL RESEARCH in the preparation of this study.

[2] Coffman, L. D. "The rating of teachers in service," *School Review Monograph. No. 5*, p. 14 ff., 1914.

Only a short time before, the scheme of paying labor according to the product had been adopted in the mines about Republic. The "bonus for merit" plan was thus readily comprehended by the board of education and adopted as a means of meeting the teacher situation. The details of the plan for distributing the additional compensation for merit were left to the superintendent to devise. As at first proposed and adopted, it was in general as follows: Teachers were to be rated by the superintendent and divided into five classes, namely, inferior, below average, average, above average, and superior. Teachers in the two lowest classes were not to receive any extra compensation, the others $25.00, $50.00, and $75.00 in order of merit. Later these bonuses were increased to $50.00, $100.00, and $150.00 a year.

The first simple rating scheme was composed of material from the studies of Ruediger and Strayer,[3] Elliott,[4] Boyce,[5] and others, and was used for the first time in January, 1917. Cubberley had only recently written that some such plan was the most important means of stimulating and rewarding professional growth and efficiency. At the same time, he had warned that it was the hardest plan to put into successful operation. Other school men whose opinions the writer valued asked him, some jocosely, some seriously, if he expected to weather the storm raised by the first ratings. It was, then, with mingled hopes and misgivings that the plan was presented to teachers for their consideration and criticism.

During the period when the details of the plan were being worked out, the teachers were being invited to examine the plan and were generally brought to approve its logic. At the same time they were warned that the rating scheme proposed for use was very imperfect and that the superintendent might make mistakes however just he might try to be. The immediate increase of $50.00 a year to over half the teachers, together with the prospective increases for merit, tended to stay criticism for a while. This time was used in getting the teachers ready to attack the

[3] Ruediger, W. C., and Strayer, G. D. "The qualities of merit in teachers," *Journal of Educational Psychology*, 1:272–78, May, 1910.

[4] Elliott, E. C. "How shall the merit of teachers be tested and recorded," *Educational Administration and Supervision*, 1:291–99, May, 1915.

[5] Boyce, A. C. "Methods for measuring teachers' efficiency," *Fourteenth Yearbook of the National Society for the Study of Education*, 1915, Part II, p. 10.

rating scheme, instead of the superintendent or the logic of the plan, when in due time they should become critical. Little by little they were brought to feel that they were about to cooperate in doing two of the hardest and most worthwhile things in education; namely, working out a satisfactory scheme for rating the quality of teaching, and using the scheme in determining a part of the pay of teachers.

The first formal ratings were passed out in January, 1917. The superintendent found no superior teachers and only one inferior teacher. About one-fourth of the force was rated above average, one-half average, and one-fourth below average and inferior together. Bonuses were paid for the first half of the year. Three-fourths of the teachers received checks for $12.50 or $25.00 with their first ratings. The expected criticisms appeared at once, but the lines for it to follow had been well enough drawn to confine it largely to really helpful suggestions for revising the rating scheme.

After the first general rating, the teachers became intelligently critical and cooperated actively in revising the method of rating used. Various schemes were tried which need not be described here. One involved an attempt to make standard definitions of merit.

A small group of superintendents and an equal number each of principals, supervisors, and very capable teachers were asked to choose, from among the teachers of their acquaintance, one representative of each of the five classes proposed here, namely, inferior, below average, average, above average, superior; and, then, to describe at work the teachers thus chosen to represent the several classes, or merit-groups, using the "First Rating Scheme Devised on a Cooperative Basis, 1917" as an outline for the description (Figure 1). Quite naturally the scheme fell through. We could not persuade our friends literally to write a book for us in their spare time. Gradually, the conviction grew in the minds of the teachers and the superintendent that the scheme gave too much credit to items only remotely related to the real business of the school, namely, making changes for the better in the behavior of boys and girls. Here I use *behavior* in the sense of all significant mental and physical responses to all situations.

FIGURE 1. FIRST RATING SCHEME DEVISED ON A COOPERATIVE BASIS, 1917

Teacher..... Grade or subject.....
School..... Address..... Date..... 19.....

The Teacher and Her Work

I.	The teacher	5 4 3 2 1
	A. Personal appearance	5 4 3 2 1
	B. Character	5 4 3 2 1
	C. Education	5 4 3 2 1
	D. Social efficiency	5 4 3 2 1
II.	The government of the school	5 4 3 2 1
	A. Assignments	5 4 3 2 1
	B. Morale in the despatch of assignments	5 4 3 2 1
	C. Freedom to initiate social activities	5 4 3 2 1
	D. Elimination of anti-social conduct	5 4 3 2 1
III.	Instruction as providing for educative activities	5 4 3 2 1
	A. Thinking	5 4 3 2 1
	B. Emotional reaction	5 4 3 2 1
	C. Acquisition of knowledge and skill	5 4 3 2 1
	*D. Deportment	5 4 3 2 1
IV.	The teacher's attention to	5 4 3 2 1
	A. Health and comfort of pupils	5 4 3 2 1
	B. Play and social life of pupils	5 4 3 2 1
	C. Grounds, buildings, equipment & supplies	5 4 3 2 1
	*D. Professional ethics	5 4 3 2 1

NOTE: Qualities are designated thus:—superior, 1; above average, 2; average, 3; below average, 4; inferior, 5.

* These two items were added during 1917–1918.

While in this state of mind, the author listened to an address given before the Atlantic City meeting of the National Association of Directors of Educational Research in which Assistant Superintendent Allison of Chicago stated, by way of illustrating a point about the Boyce score card, that it was his belief that the correlation between personal appearance and teaching ability was zero or actually negative.[6] Another man at the same meeting wittily remarked: "The homely girls make the principles work, while the pretty ones work the principals—p-l-e-s and p-a-l-s, please note." Only recently Morton's[7] study reveals much the

[6] Bulletin No. 1 of the Board of Education of Chicago, November 23, 1917, contains much of the material used by Mr. Allison in this address.

[7] Morton, R. L., "Qualities of merit in secondary teachers," *Educational Administration and Supervision*, 5:225–38, May-June, 1919.

same general state of affairs. He says in one place: "Evidently, then, in the judgment of the inspector, a desirable reaction on the part of the pupils cannot (certainly) be secured by a teacher whose personality and scholarship are ideal, whose methods are above reproach, and who teaches in a room where the physical factors are as they should be." In the judgment of the writer, a perfectly groomed teacher of perfect physical proportions working with perfectly graded children in a perfect physical environment *may* and often *does*, use perfectly good methods in a perfectly futile way.

This rather sweeping conclusion was pretty generally reached by teachers in Republic in March, 1918, and it was very soon afterward that they adopted certain guiding principles for their further study of rating teachers. These principles, briefly stated, are as follows:

1. Teaching, not teachers, should be rated.
2. Teaching is measurable in terms of the results only.
3. Results may be classified as inferior, below average, average, above average, or superior, only with reference to the amount of improvement made and the ability of the particular group of boys and girls to improve.

Once these principles are accepted, four general problems present themselves for solution. They are as follows:

1. Determination of a few general headings under which all the items of behavior the school desires to affect favorably through the agency of the classroom teacher can be grouped.
2. Evaluation of these headings, or groups of items of behavior, in the desired result.
3. Choice, from existing scales, of those which measure progress along the lines desired, and the creation of new scales needed, or other means of making rough estimates of progress along lines where scales are yet far off.
4. Determination of how much progress any particular group assigned to any classroom teacher ought to make.

The scheme for rendering standards fairly intelligible, which was finally decided upon as the only feasible one for Republic, was this:

1. All items on the rating card were defined in general terms, with reference to the dictionary.

2. Items were redefined in terms of the standards thought to be desirable in education.

3. As many concrete acts and conditions of teachers, teaching, pupils, schoolrooms, etc., as could be collected by the superintendent and the cooperating teachers were typewritten and made available for use in supervision. This material grew rapidly from a few pages to more than a hundred.

The seven elements or standards by which teachers were to be rated were mimeographed on separate slips of paper and distributed, with appropriate explanations and directions to those taking part in the experiment.

STANDARDS

I. Thinking

General definition: Mental activity in the course of which the mind locates a difficulty, and in the process of solving the difficulty arrives at a conclusion which is, to it, a new meaning, belief, act or way of thinking, or any combination of these. *Definition of standard:* Thinking by pupils in study or recitation, and test of the quality and amount agreed upon and set down in the course of study or other practice standards.

II. Emotional Reaction

General definition: Feelings, and actions growing out of feelings. *Definition of standard:* Appreciation resulting in immediate pleasure, and emotion leading to action which is of individual and social value.

III. Knowledge and Skill

General definition: Information and practical efficiency in doing. *Definition of standard:* Classroom practices and results as to knowledge and skill as set down in the course of study and other practice standards. (A course of study in which standards of procedure and results as to knowledge and skill required are not determined by objective measurement of both needs and results, in so far as that is possible today, is hardly to be defended.)

IV. Morale in Despatch of Work

General definition: Confidence, courage, loyalty, self-reliance, promptness, and persistence with which work is performed. *Definition of standard:* Confident, courageous, loyal, self-reliant, prompt, and persistent spirit of pupils at work.

V. Initiative in Socially Significant Situations

General definition: Ability and will to propose or choose, lay out, and carry forward work furthering the purpose of the individual and the group. *Definition of standard:* Pupils proposing or choosing, organizing, and carrying forward work furthering the educative purpose of school groups.

VI. Ethical Self-Control in Situations Socially Significant

General definition: Inhibition of actions which would interfere with carrying forward the purposes of social groups. *Definition of standard:*

Inhibition in the classroom, and other group-units of the school, of conduct interfering with carrying forward educative activity.

VII. DEPORTMENT

General definition: The manner, bearing, or style of a person in doing things. *Definition of standard:* Easy, natural, graceful, and courteous use of correct form in doing things.

INSTRUCTIONS ACCOMPANYING THE STANDARDS

THINKING STRAIGHT

All of you who arrange these standards want to express your best judgment of the relative values of the standards. In order to do this, avoid thinking of the *time order* in which you may have been taught to believe these standards are acquired by boys and girls. Think rather of the concrete acts making up each standard as being considerably different at different ages. More concretely, think of the group of boys and girls you teach as possessed, and not possessed, alternately, of the attitudes, abilities, and habits implied in each standard, and ask yourself: "In what *order of importance* would I place the *possession* of these standards by my boys and girls? How would I *emphasize* their acquisition by the pupils under my charge if I felt a deep responsibility to each individual in my group, and to society as a whole, and knew my efforts this year were to be the last conscious educative efforts to be expended on a majority of these boys and girls for the rest of their lives?" But do not rate any proposed standard low because you do not now know how to get pupils to acquire it. Rate the standard according to its importance or desirability, and face squarely the issue of finding new subject-matter or methods by which the standard may be realized. In this concrete fashion, test and re-test your arrangement of the standards.

FINAL DIRECTIONS FOR ARRANGING THE STANDARDS

1. Read the seven standards critically, trying to evaluate them.
2. Spread the standards out before you so that you can get what they contain in perspective.
3. Arrange the slips on which standards are printed in the order of the importance of the standards in the results of teaching, beginning with the most important.
4. If, in your judgment, the least important standard is so low as to approach zero, mark it zero.
5. Pin slips together in the order in which you rank the standards and return them in that order.

One hundred and thirty-two persons, all of whom were engaged in school work, assisted in the study by arranging these standards. Fifty of the judges worked under the personal direction of the author, and 45 others under the direction of one or another of the first fifty. The remainder of the judges received the material by mail. Seven of the replies were rejected because it was apparent that the persons making them had not followed directions. The returns from 125 judges were tabulated.

A few less than a hundred judges may be grouped into four divisions as follows: A group of graduate students in a certain university, a group of local teachers, a group of teachers and teachers-in-training in a city normal school, and a group made up of elementary and junior high-school teachers working under one principal in a large city. The remainder of the judgments were made by principals and superintendents in various Michigan towns and cities.

The data derived from the 125 judgments are as follows:

TABLE I. FREQUENCY WITH WHICH EACH RANK WAS GIVEN EACH ITEM

Item No.[9]	Rank[8]							
	0	1	2	3	4	5	6	7
I	.....	.....	.....	.....	11	7	28	79
III	.....	9	9	13	23	23	35	13
V	.....	3	12	23	19	31	23	14
IV	.....	6	10	27	29	28	16	9
II	.....	12	23	20	28	24	12	6
VI	.....	18	43	32	12	4	12	4
VII	1	76	29	9	3	7	.....	.....

[8] The higher the rank, the larger the number indicating the rank. Items of such small value as to be insignificant, in the opinion of the judges, are scored 0.

[9] The number of items in the original material are preserved for reference.

Table I should be read as follows: Seventy-nine judges thought Item No. I most important, 28 thought it second in importance, seven thought it third in importance, and eleven thought it fourth in importance. None thought it less than fourth in importance.

The returns for the different groups have also been tabulated separately. From these tabulations the following facts appear:

1. The order of importance of the items is the same in the case of each of the groups of judges.

2. The general form of each distribution for each item is the same for each of the groups of judges.

3. The judges who worked under the personal direction of the author recognized the real differences in relative position as established by the whole group a little more frequently than did the judges to whom the material was sent by mail.

It is probably safe to conclude, therefore, that the items do in reality stand in the order of importance here assigned. On the other hand, the importance of this order may be great or small according as the absolute value assigned to the least important item in the list is great or small.

From Table I, the values of the various items in terms of probable error units have been determined and corrected into point scales of 100 and 1,000 points.

TABLE II. THE VALUES OF THE ITEMS

Value of Intervals		Cumulative or Total Values		Percent Each Value Is of Total Value	Adjusted Points	
					Basis of 100	Basis of 1000
0–VII	3.0	VII	3.0	7.37	7	75
VII–VI	1.6	VI	4.6	11.30	11	115
VI–II	1.0	II	5.6	13.76	13	135
II–IV	0.3	IV	5.9	14.50	14	145
IV–V	0.4	V	6.3	15.48	16	155
V–III	0.2	III	6.5	15.97	17	160
III–I	2.3	I	8.8	21.62	22	215
Totals	8.8		40.7	100.00	100	1,000

The value of the various items varies according to the value assigned the least important item in the list. For example, if Item No. VII were zero, as one judge would have it, Item No. I would be 5.8 units, or three and six-tenths times the value of Item No. VI, under the same condition. Whereas, under the value assigned to Item No. VII, Item No. I is only one and nine-tenths times the value of Item No. VI. On the other hand, if Item No. VII were assigned a value of 5.0 units, Item No. I would be only about two times the value of Item No. VII; whereas, under the value now assigned to Item No. VII, Item No. I is three times as important as Item No. VII. Without going any further into the need for, and difficulties involved in, trying to fix a value for one of the items with reference to zero, it may be said that three units were adopted as the value of the least important item, mainly, because the author was in constant contact

with a number of judges who were willing, for the most part, to allow a value that high for the item in question, but were unwilling that the value should be placed any higher. The reason, then, for assigning a value of three units to Item No. VII, *deportment*, was a practical one rather than a scientific one.

The rating scheme which follows is based upon the values given in Table II.

FIGURE 2. TENTATIVE PLAN FOR RATING A TEACHER ON THE PROGRESS SHOWN BY PUPILS

Teacher_____ Training_____
Experience _____
Grade_____ Subject_____ Date_____

Rough estimate of GENERAL MERIT: A B C D E (Circle thus: Ⓑ)

Analysis of results or progress by observation, examination, or application of standardized tests or scales, or by two or more of these methods:

GENERAL MERIT.....	E	D	C	B	A
I. Deportment.....	1	2	3 4 5	6	7
II. Ethical self-control....	1	2 3	4 5 6 7 8	9 10	11
III. Emotional reaction....	1	2 3 4	5 6 7 8 9	10 11 12	13
IV. Morale.....	1	2 3 4	5 6 7 8 9 10	11 12 13	14
V. Initiative.....	1	2 3 4 5	6 7 8 9 10 11	12 13 14 15	16
VI. Knowledge and skill...	1	2 3 4 5	6 7 8 9 10 11 12	13 14 15 16	17
VII. Thinking.....	1 2	3 4 5 6	7 8 9 10 11 12 13 14 15 16	17 18 19 20	21 22

Summary: Numerical score_____ Equivalent: A B C D E (Circle thus Ⓒ)

Explanation: Numbers for each item in the groups A, B, C, D, and E give the following approximately correct numerical values for each group: A (superior) 93-100; B (above average) 72-92; C (average) 30-71; D (below average) 9-29; E (inferior) 0-8.

SUGGESTIONS FOR IMPROVEMENT:

(Criticisms interpreting the rating given usually cover several typewritten pages, and contain references to the list of "concrete acts" appearing below, results of standard tests given to pupils, and the principles of education as expressed in standard books on education and psychology. *A brief summary of this material appears here.* Copies are kept for reference and comparison.)

_____

Superintendent

While still working with the typical mixed rating scheme prepared as the result of the first cooperative patchwork on rating plans, considerable progress was made in collecting concrete examples of each standard proposed. Enough was done to make it clear that the bulk of such material, if collected, would be enormous. While work was progressing on the evaluation of the seven general headings, some attempt was made to choose applicable material from the earlier study and restate it as a list of concrete acts, which, if observed in pupils, would be some evidence that the standards under which they were classified were being acquired. To this material were added statements concerning the standard tests and scales in use or proposed for use in Republic schools. Lastly, teachers contributed an enormous amount of material so detailed that it was thought necessary for present purposes to have a committee classify, arrange, and condense it into the limits of seven mimeographed pages.

The list of concrete acts which follows represents a condensed statement of the supporting material used with the proposed scheme for rating teachers on the basis of the results of their teaching. Any teacher, pupil, or supervisory officer, attempting to use this material will of necessity choose only those items applicable to the case in hand. Many teachers have prepared for themselves much more complete and detailed examples under each standard, but they fall under some of the headings given.

CONCRETE ACTS

Standard I. Thinking

1. Attains standard score for his grade in
   a. Stone's Reasoning Tests (grades 3–8)
   b. Composition (grades 4–12)
   c. Trabue Language Scale (grades 2–12)
   d. Thorndike's Visual Vocabulary Scales (grades 3–12)
   e. Thorndike's Scale Alpha 2 for Measuring the Understanding of Sentences (grades 3–12)
   f. Starch's Physics Test
   g. Henmon's Latin Tests, *etc.*
2. Attains normal school grades in
   a. School tests over minimum essentials in arithmetic
   b. Teacher's or superintendent's test in other subjects
   c. School tests in grammar (grades 5–8).
3. Expresses himself clearly in his own words.
4. Exhibits ready ability in reproducing in recitations the thinking that has been done before in mastering past work.

5. Interprets intelligently any complex directions for work.
6. Classifies and arranges material well.
7. Defines accurately, though sometimes awkwardly. (In the kindergarten by pointing and gesturing.)
8. Locates and defines difficulties in material suitable for his grade.
9. Proposes solutions to problems cautiously and tries them, selecting and rejecting material intelligently.
10. Reaches tentative conclusions and holds them tentatively while searching for more evidence.
11. Verifies conclusions carefully before considering them final.
12. Considers the bearings of conclusions carefully.
13. Accepts the true bearings of conclusions when they are pointed out.
14. Evaluates problems as well as the material used in the solution of problems.
15. Decides correctly when to depend on his own resources and when to seek help.

STANDARD II. KNOWLEDGE AND SKILL

1. Attains standard scores for his grade in
   a. Courtis Standard Research Tests, Series B, in fundamentals of arithmetic (grades 4–8)
   b. Woody's Arithmetic Scales (grades 2–8)
   c. School tests in minimum essentials in arithmetic (grades 3–8)
   d. School tests in minimum essentials in grammar (grades 5–8)
   e. Spelling words from Ayres Spelling Scale concealed in sentences
   f. Composition, technic (grades 2–12)
   g. Copying familiar material (rate and quality) Ayres Handwriting Scale "Gettysburg Edition"
   h. Stone's Reasoning Tests (grades 3–8)
   i. Trabue's Language Scale (grades 2–12)
   j. Starch's Physics Test
   k. Thorndike's Visual Vocabulary Scale (grades 3–12)
   l. Thorndike's Scale Alpha 2 for Measuring the Understanding of Sentences (grades 3–12)
   m. Henmon's Latin Tests
   n. Rugg and Clark's Standardized Tests in First-Year Algebra
2. Attains normal grades on teacher's and superintendent's tests in subjects not covered by standard tests.
3. Exhibits daily in the recitation a ready knowledge of facts and skill in fundamental processes of the subject in hand.

   Note: Whatever value is assigned to items 2 and 3 should be apportioned about equally among the subjects for which the teacher is responsible, and for which satisfactory standard tests have not yet been devised.

STANDARD III. INITIATIVE IN SOCIALLY SIGNIFICANT SITUATIONS

1. Asks questions worth while for the whole group to answer.
2. Proposes problems essential to the progress of the group in the subject at hand.

3. Examines material in advance so as to be of service to the teacher and the class in laying out the work for the following day or week; i.e., assists actively in making the assignment.
4. Volunteers information, and makes helpful suggestions in the course of the recitation.
5. Seizes upon class problems for further reading or experiment.
6. Prepares to contribute intelligently, and offers promptly and eagerly to keep the topic, question, or problem going during the recitation.
   Note: Many recitations make one think that teaching, like mining (or dentistry), is an *extractive industry*.
7. Calls attention to current literature, discoveries, inventions, or public affairs as related to topics or questions on hand.
8. Proposes for group decision the game to be played during the play or language periods.
9. Proposes changes in games and discusses the changes with teacher and pupils.
10. Is not idle when assigned work is finished, but finds useful work to do.
11. Discovers his weak points and practices to overcome them.
12. Does many useful things without being told.
13. Asks for needed information or suggestions when his own resources fail.

STANDARD IV. MORALE

1. Attends school regularly, and arrives promptly at the opening of each session.
2. Is cheerful, and agreeable when he cannot have his own way.
3. Moves to and from classes and about halls in a prompt and orderly manner.
4. Is loyal to teachers and the work they assign.
5. Is loyal to school officers and the rules they make and enforce.
6. Is loyal to the school and its undertakings.
7. Obeys all ordinary requests promptly and cheerfully, and in spirit as well as letter.
8. Does not talk back or sulk when corrected.
9. Does not fret or worry over school tasks, but seeks to understand them and does his best cheerfully.
10. Does not cry, whine, or tattle over little things.
11. Is not discouraged by defeat or failure.
12. Does hard or otherwise disagreeable work without expectation of praise.
13. Works in the confidence that he and his classmates can do what other boys and girls have done and are doing, and a little more.
14. Relies upon his own efforts in preparing a lesson.
15. Undertakes with courage work he knows to be difficult.
16. Finishes assigned lessons even if he is compelled to spend more time on them than some of his brighter classmates.
17. Begins work promptly and plunges into the heart of it.
18. Faces duties and responsibilities squarely—does not "sidestep" or "pass the buck."
19. Does not hunt for and elect supposed "snap courses."

20. Is conscious of some of the important habits which go to make up a worthy character, and strives to act so that these habits will be formed.

STANDARD V. EMOTIONAL REACTION

1. Appreciates standards of achievement in school subjects and wants to attain them.
2. Appreciates standards of achievement in school subjects and wants his class and his school to attain them.
3. Takes pride, but not foolish pride, in his class, school, city, state, or nation.
4. Takes pride in superior workmanship, and will not do slipshod work.
5. Takes pride in the character of his associates and chooses them so that he will not be ashamed of them.
6. Takes pride in cleanliness of person, schoolroom, premises, and streets.
7. Wants to serve his class, school, town, state, and nation.
8. Enjoys good music, literature, and art.
9. Likes innocent fun on every proper occasion.
10. Enjoys school exercises:—rhythm, story-games, free games, etc.
11. Gets a true emotional reaction out of insight into external truth either in science or in religion and morals.
12. Feels and expresses reverence for ties of friendship, family, and religion.
13. Does any desirable act because he wants to be helpful, and refrains from undesirable acts because he dislikes them.
14. Appreciates kindly motives in others and gets satisfaction out of expressing his appreciation.
15. Values the personality of others and his own as well.
16. In the classroom acts of service are popular.

STANDARD VI. ETHICAL SELF-CONTROL IN SITUATIONS SOCIALLY SIGNIFICANT

1. Obeys requests promptly and cheerfully.
2. Obeys the rules of the school.
3. Enters the room and leaves the room quietly and inconspicuously, especially during school hours.
4. Avoids coughing or spitting in public.
5. Does not intrude on another person's privacy or take his time unjustly.
6. Does not "delay the game."
7. Tells the truth without evasion.
8. Borrows little and returns borrowed articles promptly and in good condition.
9. Does not steal or even borrow without permission.
10. Keeps appointments.
11. Keeps promises made, and avoids rash promises.
12. Does not copy work or seek unfair help from others.
13. Will not permit copying or give unfair help to others.
14. Does not "bluff" in the recitation.
15. Does not bribe, trade, blackmail (threaten to tell) or use any other undue influence to have his own way in athletics or other school affairs.
16. Controls temper and avoids quarrels.
17. Does not allow himself to be bribed, intimidated, or influenced unduly in any way in school affairs.

18. Does not tattle, but will not allow the interests of the school to suffer or injustice to be done because of lack of information he could supply.
19. Does not tease or bully weaker persons nor allow others to do so without protest.
20. Cooperates in protecting school buildings, premises, and streets from litter such as fruit skins, paper, and marking.

STANDARD VII. DEPORTMENT

1. Sits well back in seat leaning forward from his hips, feet on floor, head erect, and forearms resting easily on desk when writing or working at desk.
2. Rises easily from seat, stands erect on both feet, free from desk, in reciting and sits again easily.
3. Walks or runs lightly in moving about classrooms and halls.
4. Speaks and reads clearly and distinctly so that every person in the room may hear.
5. Holds book or paper in correct position when reading orally.
6. Passes and collects materials quietly and easily.
7. Takes out and puts away work quickly, quietly, and neatly.
8. Puts on and takes off wraps quickly and quietly.
9. Does not stop work to stare at visitors.
10. Is courteous:
    a. Is unassuming.
    b. Avoids abrupt speech and coarse manners.
    c. Laughs and talks quietly.
    d. Does not rush or crowd in halls.
    e. Allows others to enter doors ahead of him.
    f. Keeps to the right.
    g. Avoids passing between persons in conversation or in front of anyone.
    h. Grants a favor or acknowledges one easily.
11. Does not put pencils or pen in the mouth, or fingers in mouth or nose.
12. Dresses neatly and is clean.
13. Keeps working materials in order on desk, and at the board.
14. Turns in neat work.
15. Responds, when addressed, pleasantly and in good form, answering questions, "Yes, Miss.....";"No, Miss .....";or giving information in clear sentences.

A careful reading of the above list of concrete acts will reveal that the means at hand for making scientific observations of the progress of pupils are scanty. It is still necessary, if one wishes to know whether pupils are making progress in forming most of the desirable habits and attitudes which they ought to form as the result of their school experience, to watch them at work and play in all the situations for which the school is responsible. Consequently, it would be foolish to assert that the most careful observer can detect more than the general trend of habit and

attitude formation outside of the limited field now occupied by the scales and tests. This is one of the strong points made by teachers against the author's use of the rating scheme in rating their work.

It does not seem at all impossible, however, that, should we develop means of measuring progress in habit and attitude formation along the lines indicated in the concrete acts proposed above, we would soon develop a technic of producing the desired results in boys and girls with a great deal more certainty, ease, and rapidity than we now have reason to believe we shall develop it in the next fifty years. At least the lists above furnish the basis for further experimental work.

The facts in regard to the actual ratings given teachers from 1916 to 1919 are shown in Tables III, IV, and V.

If the marks given below represent the facts, the first semester the rating scheme was in use the median teacher in Republic was a low-average teacher. The second semester, an average teacher; the third semester, an average teacher; the fourth semester, a high-average teacher; the fifth semester, an above-average teacher; and the sixth semester, an above-average teacher. Reference to the rating scheme above would indicate that the gain was from a median teacher of ability 35 to a median teacher of ability 80. In other words, in the judgment of the superintendent, the efficiency of the average teacher in Republic schools as a result-getter *more than doubled* in the three years under discussion, and this in spite of the fact that the above-average teachers were being drawn off by schools which paid better salaries at least as fast as the superintendent was able to improve or eliminate the teacher of below-average ability. The explanation can be found only in the fact that, with better salaries, and clearer notions of what good teaching really meant, the superintendent was enabled to recruit from other cities and from normal schools and colleges a higher grade of teacher material than ever before. For example, 20 percent of the teachers now employed in Republic achieved honors for scholarship in normal school or college. Some others were recommended as the best students in special departments. However, this does not discredit the value of the rating scheme as a supervisory device for the superintendent proved able to develop teachers while in service. Thirty-seven percent of the teachers who have been employed for a semester or more in

TABLE III. RATING OF INDIVIDUAL TEACHERS—SIX SEMESTERS, 1916–1919

REPUBLIC TOWNSHIP SCHOOLS, REPUBLIC, MICHIGAN

Teacher	1916-17		1917-18		1918-19		Reason for Withdrawal
	1st Semester	2nd Semester	1st Semester	2nd Semester	1st Semester	2nd Semester	
1	C	D	D	D	C	B	
2	C	C	C	C	C	C	Request of supt.
3	B	B	B	B	A	A	
4	C	C	C	B	.....	.....	Promotion
5	D	D	C	C	B	B	
6	C	C	C	C	C	C	Request of supt.
7	C	C	D	.....	.....	.....	Request of supt.
8	B	B	.....	.....	.....	.....	Poor health
9	E	D	C	C	C	B	Request of supt.
10	C	B	.....	.....	.....	.....	Promotion
11	D	D	E	.....	.....	.....	Request of supt.
12	D	C	.....	.....	.....	.....	Dissatisfaction
13	D	D	.....	.....	.....	.....	Dissatisfaction
14	B	B	B	B	B	B	Retirement
15	E	.....	.....	.....	.....	.....	Marriage
16	B	B	B	B	A	A	
17	C	C	.....	.....	.....	.....	Marriage
18	C	.....	.....	.....	.....	.....	Promotion
19	C	C	C	C	C	C	
20	C	C	.....	.....	.....	.....	Promotion
21	C	.....	.....	.....	.....	.....	Death in family
22	.....	C	D	E	.....	.....	Request of supt.
23	.....	B	.....	.....	.....	.....	Promotion
24	.....	C	B	B	.....	.....	Promotion
25	.....	.....	B	B	B	B	
26	.....	.....	E	D	B	B	
27	.....	.....	C	B	B	B	
28	.....	.....	B	B	B	.....	Poor health
29	.....	.....	C	B	C	B	
30	.....	.....	C	B	B	B	
31	.....	.....	C	C	.....	.....	Promotion
32	.....	.....	.....	C	.....	.....	Promotion
33	.....	.....	.....	D	B	B	
34	.....	.....	.....	.....	.....	B	
35	.....	.....	.....	.....	D	D	
36	.....	.....	.....	.....	B	B	
37	.....	.....	.....	.....	B	B	
38	.....	.....	.....	.....	B	B	Death

A blank in the column "reason for withdrawal" means that the teacher is still in service in Republic schools.

"Promotion" means taken by some other city at a higher salary.

TABLE IV. DISTRIBUTION OF MARKS GIVEN TO TEACHERS, BY SEMESTERS, 1916–1919
REPUBLIC TOWNSHIP SCHOOLS, REPUBLIC, MICHIGAN

Mark	1916-17		1917-18		1918-19		Total
	1st Semester	2nd Semester	1st Semester	2nd Semester	1st Semester	2nd Semester	
A	.....	.....	.....	.....	2	2	4
B	4	6	6	10	11	14	51
C	11	10	10	7	7	3	48
D	4	5	3	3	1	1	17
E	2	.....	2	1	.....	.....	5
Total....	21	21	21	21	21	20	125

TABLE V. DISTRIBUTION OF LAST MARKS GIVEN TO TEACHERS WITHDRAWING FROM REPUBLIC SCHOOLS

Mark	Reason for Withdrawal			Totals
	Required	Promotion	Other Reasons	
A	.....	.....	.....	.....
B	1	5	3	9
C	3	4	2	9
D	2	.....	.....	2
E	2	.....	1	3
Total....	8	9	6	23

Republic schools during the last three years have shown enough improvement to cross the boundary between a lower and a higher rank. Fifty-three percent of the teachers now in Republic schools have improved at least one division. In other words, supervision, as it found expression in suggestions for improvement in the items of the rating scheme, was about equally responsible with elimination of the less capable and the employment in their places of the more capable type of teacher, for whatever improvement has taken place in the efficiency of the teaching corps.

Of course, the question of the accuracy of the ratings of the teachers is an important one. The study has the limits imposed by the fact that one judge, and only one, rated the work of one group of teachers, and only one. On the other hand, the methods

used in rating were, it is believed, vastly more objective and hence, more reliable, than those presented in any other rating study yet made. To the mind of the author the greatest evidence against the validity of the absolute rating is the fact that the median teacher is rated *above average*, and that the distribution of teachers is around that point instead of around a teacher rated *average*. Every other bit of evidence points to the fact that a very marked improvement has taken place in the teaching corps in Republic schools. Hence, if serious error has been made, it was made when the teachers of Republic were rated for the first time in January, 1917.

The absolute authority placed in the hands of the superintendent to eliminate teachers had so much to do with whatever success attended the use of the payment-for-merit plan, that it would be foolish to recommend the plan for general adoption where the authority mentioned does not exist. The reasons for which teachers could be dismissed were as follows:

1. Low efficiency, without, in the judgment of the superintendent, prospect of improvement in the immediate future.
2. Acts injurious to the interests of the school or the community, repeated after warning by the superintendent.

Republic, like every other community in the land, has its school politicians. These men and women study constantly every feature of school administration, supervision, and teaching, not for the sake of providing better school facilities for boys and girls, but for the sake of gaining personal advantage from any phase of school work which can be put in the wrong light before the public. These persons do not have to be reasonable or consistent in order to be troublesome. Soon after the bonuses were made large enough to attract their attention, they began to demand that the amount of the additional compensation should be saved to the public. They contended that a teacher would teach a year for the basal salary just as willingly and just as efficiently as she would for the basal salary plus the bonus. They contended further that the teacher who was not that sort of an idealist was not fit to teach boys and girls anyhow. Even if the scheme could have been defended successfully from attacks from without, it would still have been in the way when it came to employing new teachers; for the teachers desired could hardly have been employed even for

a sum equal to the basal salary and the median bonus ($100 a year) combined. It was clearly impossible to secure funds to care for the bonuses in addition to the necessary basal salaries. Hence, the additional compensation-for-merit scheme was abandoned in 1919 and the superintendent and most of the teachers breathed a sigh of relief.

The rating scheme proposed above is still in use as a supervisory device, but, of course, without any relation to the salary schedule. Used in this way, the rating card is a valuable supervisory instrument. Additional evidence of this fact was obtained as follows:

Some time following the fifth semi-annual rating the superintendent was requested to present the results of his inquiry before a state meeting of superintendents and school board members. Accordingly, the following notice was sent to teachers in the largest building in Republic Township:

> I have been asked to present the results of my investigation leading to a tentative scheme for rating teachers before the State Association of Superintendents and School Board Members. Before accepting the invitation, I should like your candid opinion as to whether your cooperation in forming the scheme and in being rated by it has affected your work and how. Record your conclusions on this paper without consultation and without signing the paper. No effort will be made to hold anyone responsible for adverse judgments. Indeed, no effort will be made to discover who wrote which paper. However, the opinions may be classified as to the amount of professional thought they reveal before they are presented to the Republic teachers or any other audience.
>
> WM. L. CONNOR
> *Superintendent*

Replies were received in sealed envelopes, shuffled thoroughly by a clerical assistant, and typed for the consideration of the superintendent. They ranged from replies as favorable as the following:

> My opinion of the rating scheme is as follows:
>
> First, it aids the teacher to measure her pupils, and find their weaknesses, thereby giving her a chance to help them overcome their trouble, whereby the teacher gets the result required.
>
> Second, it helps the teacher to measure herself and gives her a chance to study the standard by which she is measured.
>
> Third, following the rating scheme as closely as possible helps my pupils to think and helps me to help them.

To those as unsatisfactory as the following:

> If my cooperation in forming our rating scheme, and being rated by it, has in any way affected my work in the school I am entirely unconscious of it.

Of the seventeen replies received, twelve were favorable and five adverse or noncommittal. The comments, however, make it clear that a great deal of good came out of the work of rating teachers. On the other hand, it would be difficult to read through the discussions presented without gaining the impression that a great deal of misunderstanding and hard feeling existed. Indeed, enough soreness is in evidence to have disrupted any administration not securely founded. However, the dissatisfaction was directed more against the payment-for-merit plan than against the actual operation of the rating scheme as a supervisory device.

It is safe to say that at least three-fourths of all teachers employed in Republic schools were willing to work under the merit plan, and very seldom did the other fourth openly express dissatisfaction. How much of this seeming content was due to the fact that everybody's salary was going up anyhow (the scheme was accompanied by a general rise in wages in no essentail way related to it), how much of it was due to the merits of the rating scheme, how much to the fact that teachers cooperated in forming the plan, and how much to the fact that the superintendent exercised rather unusual powers in employing and discharging teachers, it would be hard to tell.

However, if the superintendent of the Republic schools could secure a living and saving wage for the least experienced and poorest trained teacher in the corps, together with reasonable increases for additional experience and training, up to 75 percent more than the minimum wage, he would recommend that the question of extra compensation for merit be reopened.

In the meantime, the rating card proposed above, while imperfect in certain respects, is still in use in supervision, and really represents an advance over previous efforts. It is a useful supervisory device because it directs attention effectively to important elements in the changes which it is a teacher's task to produce in children.

REPRODUCTION AS A MEASURE OF READING ABILITY[1]

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THE IMPORTANCE OF SILENT READING

Reading in some form occupies a large share of the curriculum of both lower and upper grades. In the first grade the time is almost wholly occupied in teaching children how to read; and, oral reading predominates. As the child progresses through the grades the time devoted to oral reading gradually diminishes and the time devoted to silent reading increases.

These two forms of reading have entirely different aims. Oral reading above the primary grades aims to convey the thought to some hearer. Correct pronunciation, clear expression, and good enunciation are, therefore, necessary in the oral work. These, however, are only the mechanics which enable the reader to convey the thought which he has in mind with force and understanding.

In silent reading, on the other hand, the aim is to teach the pupil to obtain the thought from the printed page for himself. This silent reading is followed by some form of reproduction either at once or at some future time. Until recently the teacher of the upper elementary grades has not felt the importance of *teaching* silent reading. Even now it is very probable that she does not realize the full importance of this teaching. Reading, oral or silent, means the recognition of the printed word as a symbol and a correct interpretation of the symbol into a picture for which the symbol stands.

FACTORS IN SILENT READING

This is not by any means a simple process. It may be analyzed into the following factors:

1. Correct visualization of each word
2. Knowledge of the various meanings of each word
3. Choice of the correct meaning as shown by the context

[1] An address delivered before the National Association of Directors of Educational Research at Cleveland, Ohio, February, 26, 1920. In the absence of Mr. Kallom the address was presented by Miss Harriet M. Barthelmess.

4. Forming of the correct relations between these meanings in order to interpret phrases and clauses

5. Forming of the correct relations between phrases and clauses in order to interpret sentences and paragraphs.

This interpretation of words, phrases, sentences, and paragraphs depends on at least two things: (a) the pupil's experience; (b) his ability to recall the experience and apply it to the case at hand.

Any inability on the part of the pupil to make application of his experiences or the making of a wrong application results in error.

Two illustrations will make this thought clear. Question 14 of Kelly's Kansas Silent Reading Test II reads as follows:

> A list of words is given below. One of them is needed to complete the thought in the following sentence: The roads became muddy when the snow .....
>
> Do not put the missing word in the blank space left in the sentence, but put a cross below the word in the list which is next above the word needed in the sentence.
>
> water
> is
> melted
> snow

This question is one of the most difficult in the entire test, being given the value of 4.9. To solve this question correctly the pupil must:

1. Refrain from filling in the blank with the correct word
2. Correctly interpret the phrase "below the word in the list"
3. Correctly interpret the clause "which is next above the word needed."

These three phases must be correctly interpreted not only individually *but also with relation to each other* in order to get the correct answer. The high value of 4.9 for this question is probably due to the fact that pupils do not see the relation between the parts correctly. Pupils do not, as a rule, fail in reading the words of this selection nor in knowing the meaning of the individual words, for none of them is difficult, but they do fail in *understanding* the relation between the words, phrases, and clauses. The failure to see this relation is often laid at the door of carelessness. This may be a cause at times, but more often a lack of experience in meeting such a complicated situation is a contribu-

tory cause and at times may be the important cause of the error. The pupil has been in the habit of placing a cross before or after the word, and when he reads "put a cross" his experience leads him to put a cross before or after the word, thus making an error.

But pupils also make wrong interpretations of individual words. One of the tests given to grade v in May 1919 was the part of the story of Aladdin in which the magician directs Aladdin to go to the bottom of the stairs into a great underground building divided into three vast halls. In each of these halls Aladdin was to find four large brass vessels. A boy who had read this selection interpreted the word "vessels" to mean ships. He had a perfect picture of this underground room as some sort of museum in which these ships were placed. After some questioning as to what other meaning the word "vessels" might have, he remembered the meaning of an "urn" or "vase." Immediately his whole picture was changed. A pupil left to himself, however, does not get a chance to have this impression changed. He may, therefore, go on for some time on the basis of the wrong interpretation.

The teacher may learn of this wrong interpretation only through some form of reproduction. The great criticism against reproduction has been that it involves memory. What is generally meant is word memory without thought or without meaning. This should be decried everywhere and at all times. But the right kind of reproduction, depending on the right kind of memory should be cultivated, for every discussion depends on the ability to think correctly.

Boston's Progress

In 1915 and 1916 Mrs. Ellor Carlisle Ripley, assistant superintendent of schools, was placed in charge of the reading throughout the schools of Boston. In undertaking to improve both oral and silent reading four plans were used:

1. Asking principals and teachers to assemble the children in the auditorium, having the best readers act as an example to others by reading selections before the audience of the other pupils

2. Asking students in the various schools of elocution to read selections suitable for children before the entire school in the auditorium

3. Selecting two or three of the best readers from a number of different schools, assembling them at a central school, and having them read prepared and unprepared selections before an audience of other pupils, parents, and friends

4. Visiting a large number of rooms to hear the children (especially the poorer ones) read in their regular classes.

In conjunction with the third phase of this work, viz., when selected children had gathered from a number of schools in one auditorium, the Department of Educational Investigation and Measurement used the Kelly Silent Reading Test. One hundred and eighteen of these selected children were tested in all. They came from all grades, a few even as low as the fourth, although principals were encouraged to send upper rather than lower grade children. The results showed that these pupils had a large range of individual differences. There was a great deal of overlapping but the medians were from two to eight points higher than the standards set by Professor Kelly.

Selection of Material for Suitable Testing

As a result of having the Kelly test given to this small group of selected pupils, many of the teachers felt that reading ability was not being tested. They, therefore, wished a further test to be made with selections more nearly like the ordinary reading of pupils. As a result of this, in the fall of 1916 a committee of teachers representing grades IV to VIII inclusive, met for the purpose of selecting suitable paragraphs for testing grades IV, V, VI, VII, and VIII. The following directions were given for guiding the teachers in making their selections:

1. That the paragraph selected should be from 100 to 150 words in length

2. That the paragraph should as far as possible tell a complete story

3. That the teachers should select paragraphs suitable for their own grades

4. That paragraphs selected should not be familiar to the children.

As a result of the work of this committee, the department received for each grade four or five selections which the teacher of that grade thought were suitable. The members of the depart-

ment undertook to make from this collection of material a selection of two paragraphs for each grade, which would eventually be used for testing. Each of these paragraphs was given to approximately five hundred children. That is, a paragraph selected for grade IV by a fourth-grade teacher was given to grade IV, a paragraph selected for grade V was given to grade V, and so on. In no case was the paragraph selected for a given grade given to any other grade.

Giving and Scoring the Tests

The tests were given by a group of normal school seniors who had been trained to give them in a uniform manner. The pupil was given a sheet on which was printed the selection to be read. After this selection had been read once, and the time of reading recorded in seconds, it was collected and a four-page folder given to each pupil upon which he was asked to write a reproduction of the paragraph. After this reproduction was written, he was asked to turn to the last page of the folder and answer some questions based on the paragraph which had just been read. In other words, the pupil was required to do four things:

1. To read the selection once
2. To record the time.
3. To reproduce on another sheet all that he could remember
4. To write from memory answers to questions based on the paragraph.

The scoring of the reproduction was based on the number of ideas reproduced. What constituted each particular idea was decided upon previous to the correction of the test. In correcting the material it was very difficult at times to determine whether the idea had been reproduced by the pupil or not. In many other instances it was perfectly clear that the pupil, instead of reproducing the paragraph which he had just read, brought into the reproduction many ideas based upon his experience.

In correcting the reproduction wrong spelling was not considered as an error. How much the inability to spell a word interferes with the ability to reproduce is not known.

Returns from Grade IV

The following was one of the stories given the fourth grade to read and reproduce:

Early one morning Washington left his quarters and went alone to see for himself what his soldiers were doing in a camp which he had ordered to be fortified. The weather was so cold that he wore a long overcoat with a great cape. The coat covered his uniform, and his hat and cape did not leave much of his face to be seen. For this reason the soldiers who saw him did not know that the tall man passing by was their general, George Washington.

The following reproductions of the foregoing story illustrate how pupils weave into their reproduction extraneous ideas which have come to them through their experience.

When Georges Washington was a boy he told a lie when grew up to a Gengral no one didn't no him he had a uniform on him and a cape and a cap.

Early one morning Goeoge Washtongton went out and saw Abraham Lincoln in the window and said to him do you no me yes I do no you George Washtongton.

In the first instance the pupil retains the ideas of "George Washington," "a general," "uniform," "cape," and "cap." In addition he has added the ideas of "when he was a boy he told a lie." In the second reproduction the only thing which was retained was that the story was about George Washington. Bringing in an idea, such as that of Lincoln, which has nothing to do with the situation is an interesting but not uncommon occurrence.

Attention has been called to the fact that one source of error is a misinterpretation of the meaning of individual words. The two following reproductions of the same story show the misinterpretation of the word "quarters":

One morning Washington left his *quarters* on the table and went to see how his solderes were dowing.

Once Goerge Washington said he would go out to see what his *quarters* where doing in the camp. It was cold so he had to put on his big warm coat. He saw what his doildiers were doing. He said let us go out to camp.

The first pupil shows that of the different meanings of the word "quarters" he has selected the wrong one. He may have done this either through ignorance or through making a wrong application of his experience due to failure to remember the relation between the phrases in the selection given. The second pupil evidently has a very hazy idea of the meaning of this word and possibly no correct meaning for it.

Returns from Grade VI

Below is given one of the selections given in grade VI under the same conditions and directions as used in grade IV.

The baby seals make us think of young dogs and they play together like puppies. The mother's call to her little ones is similar to that of a sheep, and her babies' cry is like the bleating of a lamb. When they are about six weeks old they go into shallow pools and learn to swim. As they grow stronger they roll down into the sea and take excursions of miles. The seals are so valuable that men are allowed to kill only a few of them each year. They are not hard to catch. The seal hunters carry clubs about seven feet long and as thick as a baseball bat. They stun the animals by striking them on the skull and then other men come along with sharp knives and kill them.

The following is a reproduction written by an eleven-year-old girl:

The baby seals resemble our dogs and puppies. There mother's cry sounds like a sheep. When they are old they are put in a tank to learn to swim. When they are older they toss balls in a circus.

This reproduction indicates the importance of previous experience. Such a piece of work is often discarded by the teacher as useless. As a matter of fact it is a valuable means of determining what should be done for the pupil. The question to be answered is: "Why does the pupil bring in the ideas about the tank and the circus?" It is the answer to this "Why" that should guide the teacher in her future corrective work with the pupil.

Questions

As noted above, a second part of the test consisted of a number of questions based on the selection read. The first question for the fourth grade, with the answers which the department deemed acceptable and those which it deemed non-acceptable, is given below. Each of the non-acceptable answers was given by one or more pupils. In all, 42 percent answered the question correctly.

"Why did Washington leave his quarters?"

Acceptable	*Not Acceptable*
to see his soldiers	because of his trail, to see a man, to go on
to see soldiers in camp	an errand, on important business, it was cold, he was a general, he did not want to
to see his men	take it with him, he didn't want to be in
to see his army.	there, he had too much, they would not

know him, he died, he did not like it, his mother died, to look at himself, to see what they were doing, because he had to, the quarters are American money, he left it in his pocket, because he wanted to, because they told lies, to go to fight the Germans, to go to a 'feet'.

Three types of answers are to be noted among the non-acceptable:

1. Those which apparently come from another part of the story
   Illustration: because it was cold
   because he was a general
2. Those which apparently result from a failure to use the right meaning of a word
   Illustration: the quarters are American money
   he left it in his pocket
3. Those which apparently have nothing to do with the story but are based on outside experience
   Illustration: because his mother died
   because they told lies
   to go to fight the Germans.

From the returns as a whole it was plain that the paragraph was too difficult for fourth-grade pupils to read and get the thought. Only 5 percent answered correctly the question "What had Washington ordered done?" Neither was this idea included generally by the pupils in their reproduction.

In answering the questions on the story about the seals the sixth-grade pupils showed the same tendency to draw on their experience as was exhibited by the fourth-grade pupils. At one of the parks in Boston there is an aquarium where there are a number of seals. The familiarity of children of the city with this aquarium was shown by the pupils of the sixth grade in their reproductions, and particularly in their answers to the fourth question: "Where do they learn to swim?" when they wrote "at Marine Park."

Below are given the different answers to the first two questions of this selection—answers which seem to indicate again that the pupil draws largely on his experience to answer questions. If the experience suggested by the reading is more vivid than the mind

picture he gets from correctly interpreting the selection read, he tends to tell the story of that experience.

"What do baby seals look like?"

Acceptable	*Not Acceptable*
dogs puppies.	snails, beavers, bears, long and narrow, head of a rat and tail of a fish, fox, face like a rat and tail like a fish, gold, like tadpoles, base-ball bat. crabs, like big ones, bat, smooth soft skin, dark fur, cat, fish. very small, mice, monkey, lamb, long fur with spots for eyes, little cubs, Eskimos, tiger, hunter, dragon, walrus without tusks.

"What does the young seals' cry sound like?"

lamb bleating o sheep.	dog, cat, baby, loud cry, bird's cry, cow, lion, horn, bear, screech, deer, whistle, horse, dog when he watches, very big, like a ten-cent horn, saw, winds, like a wake, groan, elephant, ma ma, goat, sweet, squeaky, hoarse voice, harsh, very loud noise, echo, walrus, shriek, wolf, girl, when you sleep, whales, winds.

The first question was answered correctly by 70 percent of the group and the second by only 56 percent. Many answers show that pupils did not even approximate the correct answer and yet the answer shows an intimate knowledge of the seal as an animal at the aquarium. One who is familiar with the seal would not find it difficult to make most of the descriptions fit.

Summary

One of the purposes of a standard test is to give the teacher information concerning her class and its individual needs. Although it is necessary to have reproduction, oral or written, in most branches of the curriculum of the upper grades as a means of judging whether the pupil has learned the lesson assigned, as a basis for standard tests it will probably never be practical. Such a test violates two important rules of educational measurement in that (a) the test is subjective rather than objective and (b) the task of correcting results is prodigious.

On the other hand, answers to carefully selected questions yield as good a measure of pupils' ability to read as does reproduction, and the answers are easier to score.

In spite of these objections, however, there are certain advantages in giving such a test, for it reveals that:

1. Teachers cannot be depended upon to decide accurately whether a selection is difficult or not—This should make teachers more lenient in their criticisms of the results of the pupils' study

2. It is the relation between words, phrases, and sentences which makes the difficulty rather than the meanings of the individual words, phrases, and sentences

3. There will be certain ideas in the selection that very few pupils will be able to reproduce—These may be important or not

4. The pupil will draw very largely upon his experience and not be bound down by what he has just read. This gives the teacher a clue as to how corrective material should be used.

THE USE OF PSYCHOLOGICAL TESTS IN THE EDUCATIONAL GUIDANCE OF HIGH-SCHOOL PUPILS

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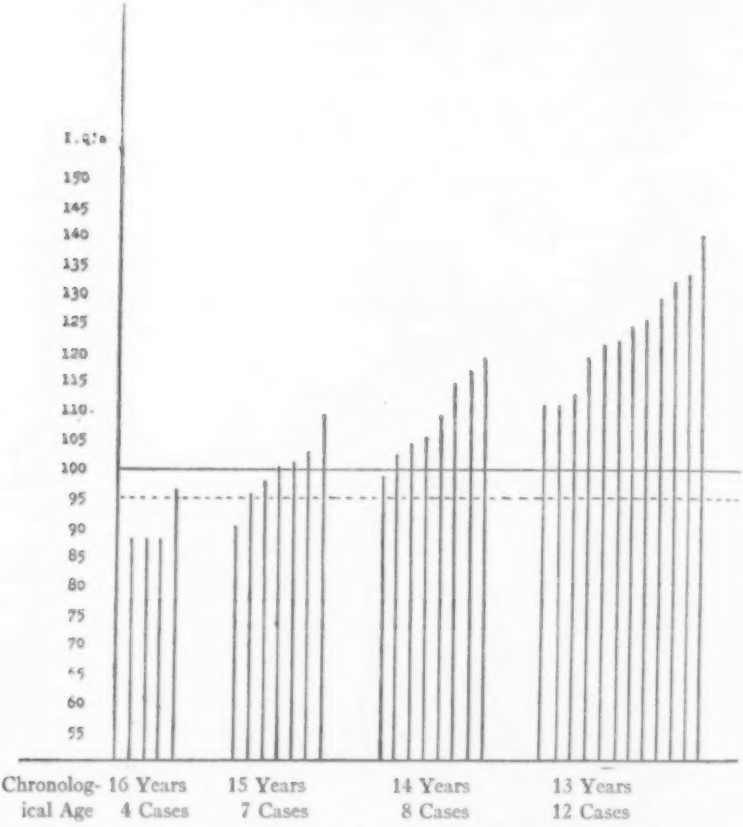
In a previous article[1] the writer has shown that there is a very close relationship between intelligence level and the elimination of pupils from high school. There are good grounds for the prediction that 75 percent of those who test below average, mentally, will fail in more than one-half of their studies during their first year of high school; that 50 percent of them will leave school to go to work during the first two years; and that none of them will remain to graduate. The members of this group demand special attention. If they are not carefully guided in the selection of their high-school work many of them will fail in all of their subjects during the first semester, with elimination as the inevitable result.

Heretofore we have acted upon the assumption that the only way to discover the capabilities of high-school pupils was to permit them to try themselves out in various subjects of the high-school curriculum. It has even been a common practice to require all first-year high-school pupils to take an abstract subject like algebra. Thus many a promising educational bark has gone down on the uncharted rocks of the first-year high-school subjects.

Experimentation with psychological tests has now reached a stage where we can begin to hope that this wasteful trial and error method of procedure is to be discarded for a more scientific plan of educational guidance. No tests have yet been devised, either mental or pedagogical, which enable the adviser to chart unerringly the educational possibilities of a given youth, but we have made sufficient progress in the science of mental measurements to be able to estimate with approximate accuracy the probable school success of a given pupil. The results of a practical experiment in educational guidance by means of mental tests will be described in the following pages.

[1] Proctor, W. M., "Psychological tests as a means of measuring the probable school success of high-school pupils," *Journal of Educational Research*, 1:258–70, April, 1920.

FIGURE 1.—ILLUSTRATING DISTRIBUTION OF 8A[2] PUPILS BY I. Q.'S AND CHRONOLOGICAL AGES



1. *Conditions surrounding the experiment.*—The mid-year 8A class of the Palo Alto Intermediate School comprising 31 pupils, was examined with the Stanford-Binet Scale in January, 1918. Figure 1 shows the distribution of intelligence quotients by chronological age groups. There were twelve thirteen-year-old pupils, eight fourteen-year-old, seven fifteen-year-old, and four sixteen-year-old pupils examined. The lowest I. Q. discovered in the thirteen-year-old group was 110. All of the thirteen-year-olds

[2] In grade designations "A" means "second half."

were, therefore, accelerated mentally. None of the fourteen-year-old group fell below 95 I. Q. They were all at or above age mentally. One fifteen-year-old had an I. Q. of 90 and would be listed as "below average" in intelligence. Of the four sixteen-year-old pupils, all of whom would be accounted chronologically retarded, three had I. Q.'s of 88, and one an I. Q. of 96. That is to say, one of the sixteen-year-olds was normal and three would rate as "dull-normal."

Of the 31 members of the 8A class, 22 entered the Palo Alto High School in February, 1918. Four members of the class entered secondary schools elsewhere, two entered business colleges, two went to work, and one, a girl with an I. Q. of 88, eloped with a soldier from a nearby encampment.

Only four members of this 8A class had earned I. Q.'s below 95. One of these, as just indicated, did not enter high school. The remaining three entered high school, but two of them dropped out before the end of the first year. The percentage of elimination from the class of those who tested below 95 I. Q. was therefore 75.0. The one who remains in high school is making an average record in scholarship. She made a rating of "average" on an Army Scale test given a few weeks later, and has shown herself capable of diligent application to her school work.

Each member of the class was questioned as to his or her vocational ambition, educational plans, and the subjects which he or she would like to take up during the first year of high school. These data, as well as results attained in Stanford-Binet and Army Scale mental tests, were recorded on cards.

2. *Use made of information gathered.*—The cooperation of the vice-principal and entering class adviser was obtained in order that the members of the 8A class might receive intelligent educational guidance when they entered the high school. Duplicate sets of cards were prepared for the use of these persons. On registration day all the newly entered 8A graduates were referred to the vice-principal or the class adviser for help in making out their curriculums. No one was permitted to file a study card without this conference.

Following are samples of the cards used in this experiment in educational guidance. The only change from the original is in the case of the name.

CARD NO. 1

Smith, Jane

Chronological age: 13 yrs., 9 mo.

Score Army Scale...151

Stanford-Binet mental age: 16 yrs., 3 mo.

Army Scale mental age: 17 yrs., 5 mo.

Army Scale I. Q.....124

Stanford-Binet I. Q.....118

High school subjects which pupil desires to take:

Sewing
French
History
Typewriting
Piano

Educational plans: To finish high school and take business college course.

Vocational ambition: To be a stenographer or bookkeeper.

Grade of work done in intermediate and grammar schools: "B" and "B+"

Comment of Examiner: If assigned to algebra can safely be placed in first "rapid progress" division.

Jane Smith was advised to take subjects that would make it possible for her to go on to college as well as to carry out her ambition to become a stenographer. She took up: English German, algebra, and typewriting. During the first semester of her high-school course she made an average of "B" in all of her subjects.

Card No. 2 relates to Mary Jones who took exactly the subjects outlined on her card, except that being a first-year pupil she was permitted to take four subjects only and had to wait until her second year for drawing. At the end of the first semester in high school she had earned three "A" grades and a "B+," with an average of 93 percent.

Here was the case of a girl with very superior ability as indicated by two different mental examinations, by her school record and by the estimates of her elementary and intermediate school teachers. She gave evidence of being an independent thinker, of knowing

CARD NO. 2

Jones, Mary

Chronological age: 13 yrs., 1 mo.

Score Army Scale...148

Stanford-Binet mental age: 17 yrs., 2 mo.

Army Scale, mental age: 17 yrs., 2 mo.

Army Scale I. Q....131

Stanford-Binet I. Q.....131

High school subjects which pupil desires to take:

English
Algebra
Latin
History
Drawing

Educational plans: To finish high school and attend a university or normal school.

Vocational ambition: To become a drawing teacher.

Grade of work done in grammar and intermediate schools: "A"

Comment of Examiner: Knows just where she is going and how to get there. May safely be permitted to select her own course of study. Assign to first division in algebra.

just what she wanted to make of herself, and just what she would have to do by way of preparation. The necessity for educational and vocational guidance in her case might well be questioned. However, it was a real advantage to her teachers to know at the very beginning of her high-school career the quality of her ability and something of her life plans in order that they might give immediate and sympathetic cooperation. Without this knowledge they might have made the mistake of holding her back to the pace of the "average" pupil. Fortified by the facts relative to her mental gifts and vocational ambitions, she is to be permitted to complete her high-school course in three years.

There is just as much danger that the bright pupil will not be given enough to do, as that the dull pupil will be given tasks that are too difficult to perform.

CARD NO. 3

Roe, Richard

Chronological age: 14 yrs., 4 mos.

Score Army Scale...150

Stanford-Binet mental age: 16 yrs. 9 mo.

Army Scale mental age: 17 yrs., 4 mo.

Army Scale I. Q....120

Stanford-Binet I. Q.....117

High school subjects which pupil desires to take:
English
History
Algebra
French

Educational plans: To finish high school then attend a university or the U. S. naval academy.

Vocational ambition: Chemical engineer or naval officer.

Grade of work done in elementary and intermediate schools: Very poor. Estimated as "average" by some grade teachers, and as "below average" by others.

Comment of Examiner: Boy has ability but needs to be waked up. Suggest that he take general science in place of history for first year. Also suggest that he be placed in first division in algebra where he will have to work. He will need to develop ability in both science and mathematics if he is to follow his vocational ambition.

The boy whose card is set forth above enrolled for English, algebra, history, and general science, upon entering high school. During his first half year he made grades of "C" in English, and "B" in each of his other subjects. This was a great improvement over the grades earned by him in the eighth grade. A recent

checking up shows that he has brought up his English grade and is maintaining college recommendation standing in all his work. The mental tests were an aid to his advisers in discovering how to spur him on to creditable achievement in his school work.

CARD NO. 4

Brown, Carrie — Chronological age: 15 yrs., 7 mo.

Score Army Scale... 100

Army Scale mental age: 14 yrs., 0 mo.,

Stanford-Binet mental age: 14 yrs., 2 mo.

Army Scale I. Q.....89

Stanford-Binet I. Q.....90

High school subjects which pupil desires to take:
English
Algebra
Latin
Typing
Drawing

Educational plans: To go to Mills College

Vocational ambition: To be a Chemist.

Grade of work done in intermediate and grammar schools:
Grades in 8A class only fair, even in work that is being repeated. Estimates of elementary and intermediate teachers: "slow" but a conscientious worker.

Comment of Examiner: Should be discouraged as to taking Latin. Algebra doubtful, but if she insists in view of desire to go to college, assign to second division.

The program finally worked out by Carrie Brown and the class adviser included English, algebra, free-hand drawing, and typing. Her grades at the end of the first semester in high school were: English, "C"; algebra, "E" (failure); free-hand drawing, "C"; typing, "B." She had failed in algebra, the subject counted as doubtful by the examiner, and had earned less than college recommendation grades in the only other subjects that would be counted

toward entrance to Mills College. Even if she completes high school her chance of continuing in college is not at all bright.

A sufficient number of sample cards have been described to illustrate the method employed. There was no coercion. Counsel and advice in the selection of subjects were all that was attempted, but the counsel and advice offered were based on all the significant information with regard to mental ability, school success, vocational ambition, and teachers' estimates of ability, that could be obtained. Certain pupils elected to take subjects which the advisers felt sure they would fail in and made passing grades. Others taking subjects on the advice of the counselors failed. Such cases simply illustrate the truth that no human agency, however fortified with information or however careful to mix common sense with theories, can hope to be infallible. The general results of the experiment, however, were very satisfactory.

3. *Results attained by "guided" and "unguided" high-school pupils.*—The original group of 107 high-school pupils which entered the Palo Alto High School in September 1916, were examined with the Stanford-Binet Scale after entering high school. They had already selected their courses of study at the time of being examined, hence can properly be designated as "the unguided" group. A comparison of the first year's work done by the members of the "unguided" group with the work done by the group that entered high school in February, 1918, and which had the benefit of counsel based on mental tests and other significant data, will illustrate the value of careful guidance as against the trial and error method of selecting high-school courses of study.

TABLE I. COMPARATIVE FACTS REGARDING "GUIDED" AND "UNGUIDED" GROUPS OF HIGH-SCHOOL PUPILS

Group	Out at Work	Per-cent	Out by Transfer	Per-cent	Failed 1 Subject	Per-cent	Failed 2 or More	Per-cent
Guided....	1	4.5	2	9.0	4	18.0	0	0.0
Unguided..	13	12.0	14	13.0	33	31.0	11	10.0

It is not exactly true to fact to designate the original group of 107 as the "unguided" group. Most of them had been examined with the Stanford-Binet before the end of the first six-week period. Whenever the results of the first six weeks of school work con-

firmed the indications of the mental tests that a pupil would probably fail in such abstract subjects as algebra, Latin, etc., that pupil was permitted to drop the subject and continue the semester carrying but three subjects. The subject dropped at the end of the first six-week period was not counted as a failure in compiling the data for Table I. The mental tests were utilized to aid in correcting the mistakes made by the pupils in the unguided selection of their subjects. To this extent, then, the original group was guided, but the guidance came after, not before school work was begun.

The number of failures registered against the "unguided" group at the end of their first year in high school would undoubtedly have been greatly increased if it had not been for the limited guidance above described. This fact gives greater significance to the data presented in Table I.

The median I. Q. of the unguided group was 105, and the median I. Q. of the guided group was 108, a difference of three points in favor of the guided group, but this is not in itself an adequate explanation of the superior record made by the guided group during its first year in high school.

The most significant facts to be found in Table I are those relating to number of failures in one subject, and in two or more subjects. It appears that 31.0 percent of the unguided group failed in one subject, and 11.0 percent failed in two or more subjects during their first year in high school, while of the guided group only 18.0 percent failed in one subject and none of them failed in two subjects Since it has been shown that failures in school work tend to increase the percentage of elimination it is reasonable to attribute the small percent of elimination due to leaving high school to go to work, in the case of the guided group, to entire absence of failures in two or more subjects.

The results of the above described experiment in educational guidance by means of mental tests would seem to justify the conclusion that such tests may be of material assistance to the high-school administrator, if used in connection with other significant data. It is certain that the methods applied in this instance, if employed in any high school, would prove greatly superior to the wasteful "trial and error" methods that now prevail.

4. *Relation of general level of intelligence to success in a given subject.*—In Table II is shown the correlation between general

level of intelligence and high-school grades in algebra. The algebra grades are recorded under the letters A, B+, B, C, C−, D, and E. The I. Q.'s come under the groups 84–89, 90–94, 95–99, etc.

TABLE II. CORRELATION BETWEEN I. Q.'S AND GRADES IN ALGEBRA OF 113 HIGH-SCHOOL PUPILS

Algebra Grades	I. Q.'s (Stanford-Binet)										
	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–over	Totals
"A"	....	....	....	2	1	3	0	1	1	3	11
"B+"	....	....	....	....	....	....	1	2	2	5	10
"B"	....	2	2	3	7	3	7	5	5	2	36
"C"	....	1	4	5	6	2	5	3	3	3	32
"C−"	....	....	....	1	....	1	....	....	....	1	3
"D"	....	1	....	2	1	1	1	....	....	....	6
"E"	1	3	5	3	....	1	2	....	....	....	15
Totals	1	7	11	16	15	11	16	11	11	14	113

Correlation (Pearson): 0.46
Probable error: 0.05

The correlation obtained, 0.46, which is nine times the probable error can be counted as having considerable significance. An examination of the data contained in Table II will show that twelve of the fifteen failures in algebra, or 80.0 percent of the total number of failures, were earned by pupils with I. Q.'s below 100. There were 35 pupils having I. Q.'s below 100, and 26 of them, or 74.3 percent earned marks below "B," which is the college recommendation grade in California. On the other hand there were 78 pupils with I. Q.'s above 100, and 45 of these, or 63.0 percent, earned marks of "B" or above. An I. Q. of 120 or over denotes very superior intelligence. There are 25 cases with I. Q.'s 120 or over in Table II. All of these succeeded in earning passing grades in algebra. Only one received a mark as low as "C−."

High-school statistics show that algebra is responsible for more failures of first-year pupils than any other subject. Table II suggests that probable success or failure in algebra can be inferred from the general level of intelligence as disclosed by mental tests. It follows that the high percentage of failure in algebra could be

materially reduced if only those were encouraged to take the subject whose general level of intelligence measured up to average or better.

5. *Relation of score in a particular mental test to success in a given high-school subject.*—Test No. 9, in Army Scale, Group Examinations *a* and *b*, is a "word relations" test. It involves a knowledge of word meanings and also the ability to use words intelligently in their proper relations to one another. Table III compares the scores made by 171 first-year pupils of the Palo Alto High School in Test No. 9, with the grades made by the same pupils in English during their first high-school year.

The directions for giving the test are as follows:

> In each of the lines below, the first two words have a certain relation. Notice that relation and draw a line under the one word in the parenthesis which has that particular relation to the third word. Begin with No. 1 and mark as many sets as you can before time is called.

Sample sets are then given by the examiner to illustrate what is wanted:

sky—blue: grass—(grow, green, cut, dead)
fish—swims: man—(boy, woman, walks, girl)
day—night: white—(red, black, clear, pure)

TABLE III. CORRELATION BETWEEN GRADES IN ENGLISH AND SCORES IN GROUP INTELLIGENCE TEST NO. 9 OF ARMY SCALE, OF 171 HIGH-SCHOOL PUPILS

Marks in First Year English	Scores in Test No. 9, Examinations *a* and *b*									
	1–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40	Totals
"A"	....	....	....	1	4	1	3	2	....	11
"B+"	....	....	1	1	7	14	10	2	....	35
"B"	....	....	1	5	16	19	13	6	....	60
"C"	....	3	9	17	17	8	6	2	....	62
"D"	....	....	....	....	1	1	....	....	....	2
"E"	....	....	....	....	1	....	....	....	....	1
Totals	....	3	11	24	46	43	32	12	....	171

Correlation (Pearson): 0.48
Probable error: 0.04

There were forty sets of words and the time allowed was three minutes. For purposes of tabulation the scores made by the

pupils are grouped: 1–4, 5–9, ... 35–39, 40–. The English grades are indicated by the letters A, B+, B, C, C−, D and E.

The correlation, 0.478, is twelve times the probable error and indicates that a good score in the "word relations" test is a fairly good index of ability in first-year high-school English. The marks in English were the final year marks, which represent the minimum of "D's" and "E's," because all conditions and failures had been removed that could be made up. The median score in Test No. 9, was 26, hence scores of 30 or over could be considered superior. There were 44 pupils who made scores of 30 or over, and 36 of these or 82.0 percent made marks in first-year English of "B" or above. Of the 89 who made scores of from 20 to 29 inclusive, 68.7 percent made marks in first-year English of "B" or above. While of the 38 who made scores of from one to nineteen inclusive, only 23.7 percent made marks of "B" or above.

Stated in terms of recommendation for college the above analysis of the data of Table III means that 76.3 percent of the high-school pupils whose ability in word relations is represented by a score of less than 20 fail to secure a college recommendation grade, while only 18.0 percent of those who attain a score of 30 or over in the same test fail to secure such a grade.

These results seem to indicate that a series of tests involving the fundamental traits of mind essential to the successful study of English could be devised. But there are so many mental traits involved in the mastery of the subject of English that a series of tests bringing into play all those traits would undoubtedly be found to be a good test of general intelligence as well as a test of specific ability in English.

Summary and Conclusions

1. The results of an experiment in educational guidance, in which all the members of an 8A class about to enter high school were given mental tests and advised with reference to their first year high-school work, proved very satisfactory. Compared with an unguided group it was found that while 31 percent of the unguided group failed in one subject, and 11 percent failed in two subjects during their first high-school year, only 18 percent of the guided group failed in one subject and none of them failed in two subjects. The mental tests aided in the discovery of the pupil's

general level of intelligence, made possible the giving of sound educational advice at the time when it would do the most good, and thus tended to reduce the percentage of failure and elimination. The methods employed can be adapted to the needs of any high school.

2. The general level of intelligence is shown to have real significance as a means of predicting success in a particular subject, such as algebra. In Table II it was shown that 100 percent of those having I. Q.'s of 120 or over passed in their algebra, while 40 percent of those with I. Q.'s below 100 either failed or were conditioned in algebra, and only 20 percent of the members of this group earned college recommendation grades. The general level of intelligence could be relied upon as a means of selecting those who would be most likely to succeed in algebra and kindred subjects.

3. Success in a particular test of a series may be a fairly reliable index of success in a high-school subject involving the mental traits supposed to be measured by the test in question. High scores in the "word-relations" test of the Army Scale, Examinations *a* and *b*, correspond generally to high marks in first-year high-school English, while scores below twenty in the same test correspond generally to low marks in the same subject.

4. Mental tests for purposes of prognosis in individual high-school subjects such as algebra, English, etc., could no doubt be devised. But the mastery of any high-school subject involves such a complex of mental traits that any test which proves to be a good test of ability to succeed in one subject is quite apt to be found a good test of general mental ability. It has already been shown that a high-school pupil having a high level of intelligence will probably succeed in all of his subjects, and conversely that a pupil having a low level of intelligence is apt to fail in most of his high-school subjects. The best way, therefore, in which to arrive at an estimate of a given pupil's probable success in a specific high-school subject is to discover the general level of his intelligence. It follows that standardized mental tests may render invaluable service in the educational guidance of high-school pupils. Particularly will this be found to be true if the results of the mental test are interpreted in the light of other significant data, such as school marks made in previous grades, teachers' estimates of ability, and educational and vocational plans.

THE OPERATION OF BUREAUS OF EDUCATIONAL RESEARCH—WITH PARTICULAR REFERENCE TO WISCONSIN

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A remarkable development in scientific methods of studying educational problems has taken place within the past few years—a development which has made it possible for well-informed persons to know more fully and accurately than ever before the possibilities and limitations of educational improvement.

The evidence of this development may be found in many types of material, e.g., in numerous published surveys, school reports, reports of educational conferences, bulletins of bureaus of research, scores of recent educational monographs, and hundreds of magazine articles. Our methods of treatment of the statistics of attendance, progress and promotion, courses of study, teaching personnel, buildings and equipment, and finance have been greatly improved; while more noteworthy than any other has been the advance in the technic of measuring the achievements of pupils.

Unfortunately, however, the utilization of these scientific methods is still far from common in school practice. Moreover, the knowledge of what has been done and can be done in education is still largely the possession of a few. The problem now is to make these methods and this knowledge widely available and practically effective. To accomplish this the results, methods, and spirit of investigation must be put into operation in every school.

The so-called bureau of research is the most active and effective agency today for making these newer developments a part of our practice. Without the intelligent direction and supervision of such an agency, teachers and administrators will not benefit to the fullest extent from our advance in scientific methods. Scientific supervision of this sort enables the weak schools to gain strength and the strong to grow still stronger; makes the successful activities of one school available for others; and develops teamwork among schools. Incomparably more

effective are the united efforts of such schools than the spasmodic efforts of single schools. It is the function of bureaus of school research to provide supervision of this kind, and to bring about over a large area the application of scientific procedure to problems of administration, supervision, and teaching. School systems that have installed research bureaus have come to stand out in marked contrast with others that have failed to do so.

Measurement of Instruction as a Bureau Problem

The problems that should command the attention of bureaus of research are many. One of the most important is the problem of applying scientific procedure in measuring and improving the product of instruction. At present only a comparatively few principals and teachers can be expected to proceed unaided. Those who can, will nevertheless lack the stimulation which results from a knowledge of the success of others in wrestling with the same problems. The need of supervision of educational measurement in this restricted sense arises from another source. Many of our school systems, city and state, are deficient in the amount of helpful supervisory aid which they can give to teachers. Educational measurement furnishes a very fruitful instrument of supervision. With a comparatively small expenditure of money, a large number of schools and teachers can be effectively reached. This fact has undoubtedly had its influence on the rapidity with which bureaus of educational measurement, or research, have developed. Such organizations ought soon to be found in every state and in every city of large or moderate size.

Educational measurement on a large scale involves the cooperation of superintendents, principals, and teachers. It is the task of bureaus of research to build up such cooperation. To secure it requires well-directed efforts on the part of those in charge of the bureaus. In the first place, it should be assumed that the large majority of superintendents, principals, and teachers are progressive at heart, that they earnestly desire to know how they can improve the quality of instruction, and that they will decide upon a wise course of procedure, if the facts are clearly presented. In the second place, it will be necessary to make a clear presentation of the merits and possibilities of educational measurements, and in doing so there will be abundant

opportunity for the employment of tact and good judgment. Moreover, the supervisor or director in charge must maintain first-hand contact with the schools through field work. Without it he will not be in a position to realize the possibilities and limitations of local schools and teachers, nor can he prescribe accurately for their improvement. This is exceedingly important in all the bureau work of a state department or university.

The attitude of those whom the director hopes to reach will depend upon their previous acquaintance in the field of educational investigation and measurement. For convenience we may divide school heads and teachers into three groups: Group I: those partly acquainted with educational measurements and their uses, as a result of what they have read or have heard on various occasions; Group II: those wholly, or almost wholly, unfamiliar with the newer developments in educational investigation; and Group III: those who have had considerable experience in their application. The director's efforts to stimulate educational research will differ in each of these cases.

Group I. Those Partly Acquainted with Educational Measurement

Most superintendents even in states which do not support bureaus of research, are partly acquainted with educational measurements and their uses. They are, therefore, for the most part in a receptive mood. Although they are often eager to begin actual investigation, they, nevertheless, hesitate because of unfamiliarity with the details of procedure and lack of confidence in their own ability. In such cases, the presence of the supervisor or director is all that is needed to set the movement on foot.

In visits to schools of this type, the director must adopt a sympathetic attitude. He must endeavor to find out what the schools have tried or are trying to do. By so doing he will discover wherein his own services will be of most help. Among other things, he should make inquiry as to the superintendent's plan for the professional development of his teaching staff. Again, he should learn what subjects of the curriculum are being attacked with a view to improving instruction. The services of the director will usually be most welcomed, if he exhibits a desire to aid in

carrying out the superintendent's plans. With this point as a beginning he will be in a position to make recommendations for additional lines of investigation.

Where such schools have already planned to make some application of educational measurements, they will welcome the director's aid and guidance in the details, such as administering a test, and scoring and tabulating the results. While we do not believe that much of his time should be spent in this fashion, such assistance is often quite necessary in new fields. As far as possible, however, his time should be given to interpreting and teaching others how to interpret the results attained, assisting teachers in the finer diagnostic analysis of results, making suggestions for remedial work, and planning for further experimentation. By all means he should make it a point to meet teachers and principals individually and in groups. The findings and suggestions can then be made the subject of discussion. It is very important that teachers be made to feel that their use of measurements must not stop with a compilation of results, and it is at this point that the services of the director are most needed. Without constructive guidance much well-intentioned effort is apt to count for naught.

Where the supervisor or director finds it impossible to be present in person, he can assist materially through correspondence. When he is asked for information on such matters as school building standards, grading and promotion standards, available tests in various subjects and suggestions as to their use, he is in a position to help superintendents or principals to proceed wisely and to steer them away from pitfalls. In the case of tests, he should ask in each instance that a copy of the results be sent him for examination and criticism.

Group II. Those Unacquainted with Educational Measurement

Every director, particularly in a new field, must expect to find some superintendents, principals, and teachers who are to all intents unacquainted with educational measurements and their significance. He should endeavor to reach as many of these as possible, thus recruiting the ranks of those better acquainted with the field. There are several avenues and instruments of approach that can be used to good advantage, e.g., conventions of superin-

tendents and principals, teachers' institutes and other educational gatherings and the columns of state educational publications.

The most fruitful reward of effort in this direction results, as before, from personal visitation. This offers opportunity to "talk things over," to tell what has been done elsewhere, to show samples of standard tests, to tell how they may be used, to point out their merits and demerits, to indicate the benefits to be gained from their application, and to suggest lines of investigation. If this part of the work is well done, it will usually result in an invitation to undertake some experimentation, to supply some standardized tests, or possibly to meet with the teachers and explain to them the uses of such tests. New bureaus will find this type of field work advisable whenever it is at all possible.

Group III. Those Experienced in Educational Measurement

In schools that have already made more or less use of scientific methods of attacking educational problems, the director's efforts can be centered upon an analysis of some of the results and their implications. It should be his business to see, for example, that the diagnostic phase of testing is properly understood and emphasized. It will be a part of his task to demonstrate from the actual papers of the children the diagnostic values and possibilities of the tests used, to suggest forms for tabulating and effectively representing the findings, to indicate possible needed revisions in teaching method, course of study, or gradation of pupils, to propose additional equipment in the way of books, maps, scales for testing, practice materials, etc., and to plan lines of further research and experimentation. Clearly, the director should be a good general supervisor of instruction. He will often find it impossible to give each school all of the personal attention it needs. If, however—as in a state department—there are general supervisors of instruction at work out in the field, they can be instructed and enlisted to aid in carrying out remedial measures in local schools. Their cooperation will be extremely valuable.

Not too much should be expected of schools at the start. In the first place, it is not advisable to attempt many lines of investigation in a given school system, particularly if several of them affect the same teachers. When standardized tests are applied, it is well to confine the testing to one subject at a time. Rarely

should more than two be attempted simultaneously. If too many tests are undertaken, confusion results, and the satisfactory treatment of any one of them is difficult. The professional energies of the teaching staff should be organized for a "drive" on the subject chosen. Not until its objectives have been reached should other subjects be attacked. In Wisconsin it has been the practice in most instances to set the dates for successive cooperative tests so that a period of two months or more may intervene between tests in different subjects. Arithmetic may be tested in November and reading in February. This allows the teachers and principals some time to work out remedial measures. If we may be permitted to offer a criticism upon our own work, it is that during the first year we failed to allow sufficient opportunity for this sort of concentration. In the second place, simple tests should be selected for use in all schools that have had no previous experience with tests, or experience of a very limited kind. In such schools, the many administrative details connected with the more elaborate tests only serve to obscure their real purpose.

After the Work Has Been Well Started

The program outlined thus far has to do with the initial building of a foundation for educational research. After a group of superintendents has been trained to proceed with research and experimentation, the work of the director becomes somewhat different in character. If possible, an annual conference of school heads should be arranged. A number of states now hold such conferences, the best known being those held at Indiana University. At such gatherings the results of previous efforts can be reviewed. Matters for cooperative investigation proposed for the year can be discussed and voted upon. At such times it is the business of the director to bring to the attention of the assembled school heads the most recent developments in scientific procedure in education, and to call their attention to the best recent literature on the subject. If possible at this time, it will be well to bring before the conference some prominent workers in the field of educational research from the outside, who are capable of stimulating further educational investigation and professional growth. After a few days of wholesome discussion the director's suggestions and those made by superintendents and others can be finally considered and lines of investigation

voted upon. Superintendents should be made to feel that the choice is their own. Dates that are opportune should be chosen.

A bureau of research should at all times act as a source of information for teachers, supervisors, and superintendents on questions relating to the most effective methods in teaching, supervision, or administration. A part of its function is to suggest the most recent studies of practical value, to issue reviews of stimulating and suggestive articles and monographs in the field of education, and to send out bibliographies of the best publications pertaining to problems under investigation.

Educational Measurement in Wisconsin

Organized work in educational measurements in the schools of the state began in the fall of 1916 with the appointment of a director of educational measurements by State Superintendent C. P. Cary. Previous to this, the efforts to carry on educational measurements in the state were quite meager and more or less spasmodic. Since then a definite policy of cooperative educational investigation of school conditions has been pursued. Superintendent Cary's main purpose in establishing the bureau of educational measurements was to bring about a general improvement in the achievements of pupils throughout the state. It was his belief that instruction lacked the quality of thoroughness which should be demanded. The results of investigations to date have fully substantiated this position.

While attempting to carry out the purpose just mentioned, the bureau does not limit itself to efforts at improving the work of classroom teachers and supervisors directly. It seeks to improve administrative procedure and educational conditions. General school surveys and surveys of particular phases of local school problems are undertaken. The Janesville survey has been published as an example of a general survey. Among other things, efforts are made to secure increased financial support for schools, more economical distribution of school funds, better buildings and equipment, higher salaries for teachers, selection of better trained teachers, and improved gradation of pupils.

With the exception of the tests applied in cities during the first year, standardized educational tests have been given chiefly on a cooperative basis, made possible through the generous

response of two bodies—one the city superintendents and the other the county superintendents and supervising teachers. Each group is met annually in conference. At these conferences, plans are taken up for cooperative testing for the year. In addition to the groups mentioned above certain other groups, such as the teachers in state normal schools and those in the county training schools for teachers, are called upon at times.

The schedule carried out since the bureau has been in operation, the classes and numbers of schools reporting complete results, and the numbers of children tested may be seen in the accompanying table.

The foregoing tabulation by no means represents all of the testing done during this time. It usually happens that a number of schools find it inadvisable or inconvenient to give the tests at the particular time set, and that others make incomplete or late returns, or make no returns at all. Many schools give a number of tests in addition to the cooperative tests, depending upon the nature of the local problem. With the aid of the bureau a number have been making use of group intelligence tests. Superintendents are becoming more and more alert to the necessity of more accurate classification and gradation of pupils. During the year 1918–1919, the bureau administered its own group intelligence tests to students in seven of the state normal schools, as a means of aiding the normal schools in studying the quality of the prospective teaching material.

In addition to the testing, an increasingly large number of schools are engaging in definite experimental studies of special phases of instruction. During the current year intensive remedial work in reading is being emphasized more than any other topic.

The state supervisors, in their visits to schools, are using the facts discovered through the application of tests. They meet teachers, principals, and supervisors individually and in groups. At these meetings they discuss the test results and their applications to teaching method, course of study, equipment, and gradation of pupils. This personal contact of the state supervisors with the teachers—a contact in which the teachers are helped to make the applications—is an essential and vital part of the work as it is carried on from the Wisconsin State Department of Public Instruction.

SUMMARY OF COOPERATIVE EDUCATIONAL TESTING IN WISCONSIN

Schools	Subjects	Test	Scope	No. of Children
1916–1917[1]				
Rural	Spelling	Ayres	1173 schools	15,825
"	Writing	Thorndike	173 "	2,625
"State graded" (small village)	Spelling	Ayres	132 "	7,465
"State graded"	Writing	Thorndike	9 "	720
City	Spelling	Ayres	35 cities	13,111
"	Arithmetic	Woody-A	21 "	7,500
"	Reading	Kansas	18 "	7,549
"	Writing	Thorndike	11 "	3,866
"	Composition	Hillegas, Trabue	15 "	5,848
1917–1918				
Rural	Arithmetic	Stone-Original	27 counties	3,395
"	Arithmetic	Woody-A	31 "	10,840
City	Reading	Thorndike Alpha 2	34 cities	9,821
"	Arithmetic	Stone-Original	59 "	18,495
"	"	" -Equivalent	33 "	11,010
"	Algebra	Hotz	22 "	1,663
1918–1919				
Rural	Spelling	Buckingham	45 counties	9,322
"	Reading	Monroe	43 "	9,090
City	"	"	32 cities	20,254
"	Arithmetic	Theisen-Woody	29 "	12,839
"	Latin	Brown	15 "	.....
Co. training and teacher training classes in H. S.	Reading	Thorndike A	50 schools	1,334
	"	*Rate*	41 "	....
	Arithmetic	Woody	48 "	1,304
	"	Stone	44 "	1,214
1919–1920				
City	Spelling	Ashbaugh-Iowa	114[3] cities	
"	Reading	Monroe Form II	.....[2]	
"	History	Van Wagenen	.....[2]	
Rural	Arithmetic	Theisen-Woody	.....[2]	

[1] During the first year, 1916–1917, the tests in cities were given at the time of the director's visit. In succeeding years a definite date was fixed for the giving of the tests in all schools.

[2] Returns are just now coming in. [3] To be given during the present year.

Some attention is given to the training of prospective teachers in the use and application of standardized educational tests. Teachers should possess at least a preliminary understanding and appreciation of the purposes and values of such tests when they enter upon their duties. State normal schools are urged to offer courses giving specific training in the application of standardized tests. The state supervisors of educational measurement assist in the preparation of such courses. A number of Wisconsin state normal schools now offer training in educational measurements either as a separate course or as parts of other courses in education.

The personnel of the bureau includes, in addition to the director, an assistant director, Mrs. Cecile White Flemming, Supervisor of Educational Measurements, and a statistical secretary, Miss Elizabeth A. Ahern. Besides the immediate staff the bureau has, as has been said, the benefit of the cooperation and assistance of other members of the staff of the State Department of Public Instruction. Temporary clerical and statistical assistance is secured from time to time to aid in busy seasons and when material requested by superintendents is to be prepared. It is to be regretted that sufficient funds are not provided for clerical assistance of a permanent sort. This need is sorely felt by reason of the fact that many schools look to the bureau as a clearing house for information on such matters as comparative salaries, comparative school costs, school buildings and equipment, comparative figures on standard tests, age-grade statistics, etc.

Aside from its direct service to Wisconsin schools, the bureau of the state department is called upon from time to time for suggestions for the application of educational measurements and the development of new bureaus in other states. No doubt other bureaus have had many similar requests. Such requests are an indication of the growing demand for the application of scientific methods of procedure in educational administration and supervision.

PUTTING STANDARDIZED TESTS AND SCALES TO PRACTICAL USE IN THE RURAL SCHOOLS[1]

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A supervisory district containing 26 rural, ungraded one-room schools with teachers for the most part inexperienced or untrained, a majority of whom had never worked under a superintendent before this, was the opportunity that fell to my lot when I became a New Hampshire superintendent under the new law effective September 1, 1919. It was my first experience as a superintendent. Truly the district was "virgin soil" as a member of the state department remarked to me when I took the position.

SIZING UP THE SITUATION

The first two or three weeks were spent in traveling about the district getting acquainted with the teachers and sizing up the situation. Most of the schools had already begun, the teachers having been hired by the local school boards as in the past. I found that three of the teachers were normal-school graduates, and that two had attended one summer school; but the others had no professional training whatever. Several had not attended school beyond the eighth grade, but had taught from ten to 28 years in the same school. Three were inexperienced high-school graduates in their 'teens. Fifty percent of all the teachers had never seen a professional book or magazine and did not know where to obtain one. All this of course had resulted in an ingrowing provincialism which could not but have a disastrously narrowing effect on their teaching. They were imitators of imitators. Their methods were in imitation of the teachers who had taught them and who, in their turn, had imitated their own teachers. The results were the use of methods and texts so archaic as to be amusing if they had not been at the same time such a sad commentary on our boasted educational system.

[1] This is the first of a series of articles describing some of the problems confronting an inexperienced superintendent of a rural district in New Hampshire and his attempts to solve them with the help of standardized educational tests and measurements. —EDITOR.

Most of the textbooks were sadly out of date. Arithmetics, geographies, grammars, and even histories published in the eighties were in daily use. One of the local committees insisted that they must be good books or they would not have worn so long. Of course the books were all based on the defunct doctrine of formal discipline and showed little of the psychological methods of presenting material which are the basis of modern educational procedure. The idea seemed to be that an arithmetic is an arithmetic, and a geography is a geography and that one book is as good as another so long as nothing pertaining to the subject is omitted and the leaves are all present.

I have emphasized the teaching and textbook situations because I consider them the most important factors. A few other points I shall mention briefly. As for the schoolhouses, it is sufficient to say that most of them were typical New England rural school buildings of ancient vintage, modelled variously (according to the idea of their *instigators*), upon churches, town halls, barns, and in some cases it would almost seem, upon pigpens. They were small, dirty, poorly heated, lighted and ventilated, and in short generally unsanitary and ill-suited to their purpose. As to the organization of the schools, as I have already intimated, no attempt had ever been made to grade them. Another important factor in the situation was the attitude of the communities toward expert supervision. Three of the four towns in the district had always opposed such supervision as long as it was optional and were not inclined to submit gracefully when according to the provisions of the new law it became compulsory. Such were the general conditions as revealed by my preliminary survey.

However, there were three bright spots in the general darkness of the situation. First, the splendid new state school law which made the superintendent a state official with a pretty free hand and which provided liberal state aid for rural schools where it might be necessary to keep them up to the required minimum standards. Secondly, intelligent school boards willing to cooperate. And last, my own professional equipment which included a pretty thorough training in educational measurements and an earlier experience in the teaching of rural schools. Accordingly, I tackled the proposition determined to show what scientific method in education could do for rural schools if it had the chance.

Analyzing the Situation

The following week was spent in analyzing the conditions found to exist and in deciding upon the most efficient way to bring order out of chaos. As a result of this analysis a number of definite problems seemed to stand out clearly demanding early attention. From among these problems I shall select, for present discussion, only those, in the solution of which as it seemed to me, standardized tests and scales could be used to good advantage.

Problem 1.—To grade the schools fairly and accurately.—Getting the schools graded in order to start the pupils right for their year's work was of course the most urgent problem. It would have been a comparatively simple matter to grade them arbitrarily on the basis of the teachers' judgments. But there are serious objections to this method even as a beginning, especially when the teacher is new to the school. If, for example, children are placed in grades lower than their parents think they ought to be, there is bound to be some strenuous objections from some of these parents and the only evidence one has to offer is that the teacher thought the children ought to be placed in those grades. Did you never hear this line of talk from an irate parent? "My John is just as smart as Mrs. Smith's Henry and he ought to be in the same class or above. It's a plain case of showing partiality so there now! I just won't stand it!"

It is not by any means easy in such cases to prove to the satisfaction of the parent that the teacher has a sound basis for her judgment. And the fact is that she did not have a sound basis. How did she know just what knowledge or ability a child should exhibit in order to belong in a certain grade? What standards of achievement did she have for the different grades besides her own arbitrary judgment?

Giving ordinary tests for grading purposes is also inaccurate and unfair, because such tests are devised by the teacher or superintendent and hence represent merely their judgment as to what they think a child ought to know in order to be placed in a certain grade.

Worse than all else, the children themselves are apt to become discouraged, not understanding wherein they have failed, and being at a loss as to just what they are expected to achieve. Even the superintendent and teachers, if they are conscientious, are

not satisfied because they cannot feel sure that injustice has not been done. Retarding a child without good reason, thus robbing him of a year of his time, is a serious matter, at least for the child.

What method of grading then could be found which would be fair to all concerned? After casting about for some time for a solution to this problem, it suddenly occurred to me that standardized tests would help me out of my difficulty. Did they not offer definite standards of achievement for each grade? And those standards were not based on unattainable 100 percent perfection nor upon the opinions of dogmatic educators as to what a child ought to know at the end of a certain grade. They were experimentally derived and based upon the amount of work that normal children are actually doing in the different grades throughout the whole country and not upon the amount of work somebody thinks they ought to do.

By giving these tests in all my schools I could determine just where each child belonged on the educational ladder. The process would be roughly comparable to measuring a large number of sticks of various lengths by means of a tape measure sorting them into eight piles, each pile containing sticks of about the same length. Then when angry parents wanted to know why their children were graded so low, I could show them. The children themselves could be made to see wherein they had fallen below standard and what they would have to do to come up to the standard. Both superintendent and teachers would feel that they were on solid ground. Surely I needed standardized tests the first thing.

Having reached this conclusion, I immediately ordered all the tests and scales I knew of that were sufficiently well standardized for my purpose. They covered the following subjects: arithmetic, silent and oral reading, spelling, writing, geography, history and English language.[2]

Problem 2.—How to measure the progress of pupils.—Having settled upon how to do the preliminary grading, the next problem

[2] For those who do not know standardized tests and want to get acquainted I recommend for a beginning the purchase of *Measuring the Results of Teaching* by Monroe, and *Educational Tests and Measurements* by Monroe, DeVoss, and Kelly. Both books describe the best tests and their uses and the former tells where to obtain them. These books are published by Houghton Mifflin Company, Boston and elsewhere.

was to find a just method of measuring the progress of pupils for promotion purposes. The same objections to teachers' tests hold good here as were noted in discussing the previous problem.

This problem involved, obviously, the finding of a satisfactory system of marking. It has been proved beyond doubt that ordinary teachers' marks are unfair, inaccurate, and generally unsatisfactory as a means of measuring progress or as a basis for promotion.

In measuring the progress of pupils, standardized tests must surely find their widest field of usefulness. Here the process can be compared to standing a ten-foot measuring rod beside a young tree when it is a foot high and noting its growth in height. When it has added another twelve inches it belongs in the two-foot class. Twelve inches more and it is promoted to the three-foot class, and so on. It is even possible to devise a satisfactory system of marking, for report card purposes, with the aid of such tests, as will be explained later on.

Some of the teachers thought that the new state program of studies for elementary schools would be sufficient guide for promotion purposes. This program is thoroughly practical and up-to-date. But it offers no definite, objective standards of achievement from grade to grade. Therefore it is not a satisfactory tool with which to measure the progress of pupils and to determine when they are ready for promotion. It is true that a printed program of studies specifies the subject-matter to be covered by each grade but it is left entirely to the judgment of the teacher as to when that subject-matter is covered satisfactorily. The ground may be gone over more or less thoroughly and with very unequal results according to the methods and arbitrary standards of the individual teacher. Hence, it is obvious that programs of study cannot take the place of standardized tests that are even fairly objective.

Problem 3.—How to measure the ability of teachers.—One of the greatest needs of superintendents is a method of measuring the ability of teachers that will be accurate and fair to all concerned. A method that will not leave the superintendent open to the charge of favoritism or poor judgment. A method that will satisfy a teacher who has been rated something less than "excellent" that her shortcomings are real and not hallucinations

in the mind of the superintendent due to his personal dislikes and prejudices.

What is wanted is concrete evidence of a teacher's ability or lack of ability that will allay carping criticism from whatever source. It is decidedly neither accurate nor fair to estimate a teacher's ability solely by observation made by the superintendent during his visits to the classroom. It is not fair because (a) such observations do not furnish a sound basis for judgment, (b) the superintendent's opinions are quite apt to be colored by personal prejudices toward an individual teacher or her methods, (c) classes often show at their worst in the presence of visitors, (d) even the teacher may fail to do herself justice under the critical eye of the superintendent. It is inaccurate for all the reasons noted above and because (a) some teachers do excellent work when the superintendent is present and shirk all the rest of the time, and (b) if such teachers do their own testing, even the results may be made falsely to appear satisfactory.

Provided a teacher is of good moral character with high ideals and a fairly pleasant personality, her further desirability as a teacher is measured by the results she gets as determined by the progress of the pupils when such progress is objectively measured. After all, it is results we are after, primarily. Hence, the standardized tests measure objectively both the progress of the pupils and the ability of the teacher at one and the same time.

Problem 4.—To find a practical method of supervising study and of teaching how to study.—This may seem like a large contract for the one-teacher rural school with its crowded curriculum, but I shall try to show that it can be successfully worked out by using proper methods of study supplemented by judicious use of the standardized educational tests and measurements.

This paper merely presents some of the problems confronting me in my new work together with some plans for their solution and reasons therefor. Following articles will describe in detail the working out of these plans and the results achieved.

COEFFICIENTS OF REGRESSION

LEONARD P. AYRES
Russell Sage Foundation

In the March and April numbers of the JOURNAL OF EDUCATIONAL RESEARCH there were published articles by the writer on shorter methods for computing the coefficient of correlation. The object of the present article is to describe a short method for computing the coefficients of regression and to comment briefly on the practical utility of that measure of relationship.

The coefficient of regression is a measure which tells how much change takes place in one of two series of paired values for each change of one unit in the other series. Suppose we have a set of figures giving the ages and grades of the children in a school system. Since the plan of the system is that children shall be promoted one grade each year, it is sure that there will be a high correlation between the two series.

We know, however, that in nearly all school systems many children fail to go forward at the rate of a grade each year and that the average progress is in marked degree less than the ideal. The coefficient of regression is the measure which will tell us what the average rate of progress is. It will tell what the change is in grades for each change in years or what part of a grade the average child tends to advance for each additional year of age. This is what is meant in this particular case by the statement that the coefficient of regression shows the change in one series for a unit of change in the other.

The formula for the coefficient of regression, as it has ordinarily been stated, is not easy to use or understand, but its difficulties are mostly easy to avoid. Its use will be illustrated by finding it for two correlations, one for a short list of paired values and the other for a table of distribution. The formula for finding the coefficient of correlation is the one explained by the writer in the two previous articles published in this magazine. It is as follows:

$$r = \frac{\text{Sum of products of subject and relative items minus av. of subject items} \times \text{tot. of relative items}}{\sqrt{\text{Sum of squares of sub. items minus av.} \times \text{total of these items}} \times \text{Sum of squares of rel. items minus av.} \times \text{total of these items}}$$

Let us apply this formula to a short list of paired values representing the ages and grades of ten school children. Two of them began school four years ago, two three years ago, two two years ago, two last year, and two this year. They all entered at the age of six. One of each pair went forward one grade each year while the other spent two years in each grade. Their ages and grades, together with the computation of the coefficient of correlation, are shown in the following tabulation:

	Grades (Sub.)	Ages (Rel.)	Sub.^{2}	Rel.^{2}	$S \times R$
	1	6	1	36	6
	1	6	1	36	6
	1	7	1	49	7
	2	7	4	49	14
	2	8	4	64	16
	2	9	4	81	18
	3	8	9	64	24
	3	10	9	100	30
	4	9	16	81	36
	5	10	25	100	50
Total	24	80	74	660	207
Average	2.4	8			

$$80 \times 2.4 = 192$$
$$24 \times 2.4 = 57.6$$
$$80 \times 8.0 = 640$$

$$207 - 192 = 15$$
$$74 - 57.6 = 17.4$$
$$660 - 640 = 20$$

$$r = \frac{15}{\sqrt{17.4 \times 20}} = \frac{15}{\sqrt{348}} = \frac{15}{18.65} = 0.80$$

In this example the coefficient of correlation is equal to the fraction $\frac{15}{\sqrt{17.4 \times 20}}$. The numerator (15) is derived from the

products of the items of the two series. The denominator is equal to the square root of the product of two numbers, which are 17.4 and 20. The first of these two numbers is derived from the subject series, giving the data for grades, and the second from the relative series, giving the data for ages.

The coefficients of regression are derived from this fraction and are $\frac{15}{17.4}$ and $\frac{15}{20}$. The first has as its denominator the number 17.4, which was derived from the data as to grades. The coefficient of regression $\left(\frac{15}{17.4}\right)$ tells the amount of change in ages taking place on the average in this group for a change of one in the grades. This information does not in this particular case give us information of much value.

The other coefficient of regression is the fraction $\frac{15}{20}$ in which the denominator was derived from the data on ages. This coefficient tells us how much the children in this group go forward in the grades on the average for each advancing year of age. It tells us that they go forward $\frac{15}{20}$ or $\frac{3}{4}$ of a grade for each year of age. This is in accord with the original conditions of the problem, for it was stated that half the children made 100 percent of normal progress and the other half 50 percent, or an average of 75 percent of the full rate.

This is information of an important type that cannot be secured by the simpler processes of working directly with the averages of the series and trying to compute the relationship between the time the children have been in school and the progress they have made. In many sorts of results from tests of classroom work the coefficients of regression can be used to great advantage.

The method described for finding these coefficients is far simpler than the one usually used. The formula commonly given (rho standing for the coefficient of regression) is $\rho = r\frac{\sigma_1}{\sigma_2}$.

The steps by which the method here described was derived from the standard formula may be readily followed through by anyone familiar with the ordinary notations for the coefficient of correlation. They are as follows:

$$\rho = r\frac{\sigma_1}{\sigma_2}, \quad \text{or}$$

$$\rho = \frac{\Sigma\, x\, y}{n\, \sigma_1\, \sigma_2} \times \frac{\sigma_1}{\sigma_2}, \quad \text{or}$$

$$\rho = \frac{\Sigma\, x\, y}{n\sqrt{\frac{\Sigma\, x^2}{n}}\sqrt{\frac{\Sigma\, y^2}{n}}} \times \frac{\sqrt{\frac{\Sigma\, x^2}{n}}}{\sqrt{\frac{\Sigma\, y^2}{n}}}, \quad \text{or}$$

$$\rho = \frac{\Sigma\, x\, y}{\Sigma\, y^2}$$

The application of the method described may be again illustrated by using as an example an age and grade table. The one chosen is a supposititious distribution for a system where 160 children enter each year at the age of six. They are promoted annually at a 75 percent rate and none drop out. The data for the table, together with the computations of the coefficients of correlation and regression, are shown in the accompanying tabulation.

S	R—Ages										
Grades	6	7	8	9	10	11	12	13	T	ST	SST
1	160	40	10	2					212	212	212
2		120	60	23	8	2			213	426	852
3			90	67	34	15	6	2	214	642	1,926
4				68	67	42	22	9	208	832	3,328
5					51	63	47	29	190	950	4,750
6						38	56	49	143	858	5,148
7							29	49	78	546	3,822
8								22	22	176	1,408
T	160	160	160	160	160	160	160	160	1,280	4,642	21,446
										av. of sub. items	
RT	960	1,120	1,280	1,440	1,600	1,760	1,920	2,080	12,160	$\frac{4,642}{1,280} = 3.627$	
RRT	5,760	7,840	10,240	12,960	16,000	19,360	23,040	27,040	122,240		
ΣSf	160	280	400	521	641	760	880	1,000		av. of rel. items	
R(ΣSf)	960	1,960	3,200	4,689	6,410	8,360	10,560	13,000	49,139	$\frac{12,160}{1,280} = 9.5$	

$$4,642 \times 9.5 = 44,099$$
$$4,642 \times 3.627 = 16,836$$
$$12,160 \times 9.5 = 115,520$$

$$49,139 - 44,099 = 5,040$$
$$21,446 - 16,836 = 4,610$$
$$122,240 - 115,520 = 6,720$$

$$r = \frac{5,040}{\sqrt{4,610 \times 6,720}} = \frac{5,040}{\sqrt{30,979,200}} = \frac{5,040}{5,566} = 0.91$$

$\rho_1 = 1.09 \qquad \rho_2 = 0.75$

In this case the coefficient of correlation is 0.91. Such coefficients based on age and grade tables are always high and there is surprisingly small range between those for relatively efficient school systems, having little retardation and those for far less effective systems showing high percentages of retardation.

The coefficients of regression are of greater interest and more value. In this case the coefficient of regression based on the grades is 1.09. This indicates that in this school system the children tend to average 1.09 increase in years of age for each advance of one grade.

The other coefficient in this case gives us more valuable information. It is 0.75 and is based on the ages. It tells us that the children in this system tend to go forward on the average three-fourths of a grade for each advance of one year in age. This is in agreement with the conditions laid down at the outset which were that these children were regularly promoted at a 75 percent rate.

Coefficients of regression can be made to yield information of great practical value. They may well be used in studying such questions as: regularity of attendance and promotion rates, deficiency in weight and hemoglobin counts, progress through the grades and expenditures for supervision, pages of material read in the first three grades and ability in silent reading, time spent on spelling drills and scores in spelling ability, years of schooling and earnings up to the age of fifty, and many others of the most varied character.

Editorials

REVISING THE COURSE OF STUDY

In the voluminous discussion of the reconstruction of the curriculum during the past year nothing is said about the cost. It is assumed that if the superintendent and teachers decide upon a revision, the staff will perform the task in their leisure time. But such an assumption is entirely erroneous. A new course of study can be prepared by the staff but a thorough-going revision involves too much detail work of a clerical, time-consuming sort for any staff to be able to perform it in their free time. To discover the common errors in language in a school system as a basis for a language curriculum requires anywhere from two hundred to five hundred hours of clerical work, which is the full time of one person for at least a month of eight-hour days; and this does not include the time of the supervisor of the study who formulates the plans and writes the report. To discover what mathematics is needed as a preparation for the study of one textbook in chemistry involves fifty hours of clerical work in addition to forty hours devoted to the study by the supervisor. To collect practical problems and projects to supplement the teaching of physiology and hygiene, arrange the necessary material, and prepare it for classroom use involves the expenditure of fifty hours each for three persons. And all of these are fragmentary studies.

It is quite as reasonable to expect the manual arts department to build the school buildings without assistance as to expect the staff to revise the course of study in their free time. Bricks cannot be handled as rapidly as ideas but there are more ideas in the course of study than bricks in a building and it takes time to handle ideas. The task of the revision of what children are taught is immeasurably more important than the construction of buildings and the difficulties are much more complex and quite as time-consuming if the work is thoroughly done.

It is, therefore, necessary for boards of education who authorize a revision of the course of study to provide funds to make it

possible for certain teachers to be relieved of part of their duties, to engage clerical assistance, to employ experts on technical phases of the problem, and to make the necessary studies in the research department. It is becoming increasingly necessary for state departments, the federal bureau of education, and other large educational units to establish the curriculum as one of the major projects of investigation with a staff sufficiently large to make revision more than a makeshift. The deadweight of the load is much greater than administrators have generally realized. The work cannot be done by discussion and argument. Detailed studies are necessary and details cost money.

W. W. C.

SCIENTIFIC CURRICULUM BUILDING

Scientific curriculum building involves a danger of which the curriculum makers do not appear to be aware. The method as frequently practised consists in finding out what elements of school subjects are in frequent use and incorporating these elements into the subject matter to be taught. Analysis reveals, for example, that adults make almost no use of fractions or decimals; that periodicals and newspapers contain surprisingly few historical or geographic allusions; and that the fundamental vocabulary of business and personal correspondence is astonishingly small.

Sometimes the analyst reaches the conclusion, expressed or tacit, that the curriculum should contain *no more than* these meager elements which he has found to be in frequent use. More often, however, it is those who use his results who reach this conclusion. This, we maintain, is not a correct inference. The only correct inference—and it is the inference of the more careful workers—is that, no matter what else is included, the elements thus found to be socially useful shall certainly form part of the curriculum; in other words, that they shall constitute a part of the "minimum essentials" of the subject to which they belong.

The bearing of analyses of social needs upon the curriculum may be most completely illustrated with reference to spelling. This is true not only because the social value of spelling is obvious but also because more analyses have been made of spelling usage than of any other. The principles, however, which we shall suggest have a general application to all the subjects which have been similarly studied.

In the first place, we cannot by any means be sure that the present determination of frequency of use is the true one. For example, in the list which purports to consist of the thousand commonest words, we do not find the names of our daily meals—neither *breakfast* nor *lunch*, *dinner* nor *supper*. Nor do we find the commonest articles of tableware, such as *plate*, *cup*, *knife*, *fork*, and *spoon*. Many articles of food—*potatoes*, *beans*, *beets*, *peas*, *meat*, *fish*, *bread*, and *butter*—are not named; nor are some of the commonest articles of clothing nor some of the most familiar colors. Only the horse is mentioned among domestic animals. The dog and the cat, the cow and the sheep find no place in the list.

One may contend that these may indeed be common words without being frequently used in written discourse. The contention, however, has little plausibility. A child cannot write of his play without using such words as *hide*, *jump*, *swim*, *fish*, or *sled*, and these words are omitted from the thousand most frequently used. He can scarcely write of the barnyard without requiring such omitted words as *hen* and *egg;* he cannot write about his *garden* nor the *baby* at home; nor about the *moon*, the *sun*, the *sky* nor the *stars*. Yet these are the things within his experience. They are, therefore, the sort of topics which we should expect him to write about.

On the other hand, among the "thousand commonest words" are found these: *preliminary*, *recommend*, *impossible*, *assure*, *committee*, *investigate*, *national;* and a number of terms of apparently legal meaning such as *property*, *judgment*, *testimony*, *complaint*, *agreement*, *witness*, and *conviction*. This suggests that the source of our vocabulary studies must be very greatly widened and that an enormously greater amount of written material must be examined.

In the second place, even if true frequency of use has been determined, we assert that there are other tests of value than frequency of use. For example, although the word *bread* may be rightly excluded from the thousand commonest words; yet circumstances which, while they may be relatively infrequent are nevertheless inevitable, will certainly make it at times indispensable in one's written vocabulary. Future research may conceivably confirm the present determination that *apple* and *banana*, *bright* and *beautiful*, *meat* and *drink*, likewise do not belong to the

thousand commonest words. But this is not a sufficient reason why they should be banished from our spelling curriculum. These are simple words and they stand for ideas common to the race. The ideas may not require expression quite often enough to secure for the words a place among those used with an assigned frequency; but when these ideas do require expression—and no one can escape the necessity for such expression—they become as "socially useful" as do their more frequently used competitors.

In the third place, in selecting material for the school curriculum, difficulty as well as frequency of use is a criterion. Indeed to a certain extent there is an inverse relationship between difficulty and frequency of use. Some elements of school subjects, precisely because they are frequently used, and hence often repeated, do not need to be taught at all. Such is the case, for example, with most of the two and three letter words in our language. No one who is in the least degree literate misspells *and* except by inadvertency—and correcting inadvertency is not a spelling problem. Some of the recent spellers in their attempts to adhere to the vocabulary studies have included a considerable group of words which do not constitute a spelling problem.

In the fourth place, whether with reference to spelling or any other subject of the curriculum, whatever the much-discussed aim of education may be it contemplates something more than the round of common experiences, something richer than the elemental facts of life. "A man's reach should exceed his grasp"; and it is only by providing for more than is now generally available that progress is possible. Here as elsewhere in the application of scientific procedure to education, a sound philosophy—as well as a sound common sense—must be invoked to save the scientific procedure from itself.

Four points may, therefore, be made with reference to the sufficiency of the idea of frequency of use. The first is that material far greater in amount and variety will have to be examined before we can be sure that frequency of use has been determined. The second is that certain material of relatively low frequency of occurrence has a social usefulness which renders it indispensable. The third is that difficulty, or need of being taught, is an important criterion—one which operates in particular to reject from the formal curriculum an appreciable amount of frequently used material. The fourth is that if we include in our curriculum only

the materials which are found to be frequently used by children and adults we leave altogether out of account the material which they ought to use and would use if their lives were fuller and richer. This fullness and richness, we feel quite sure, the school must envisage. Moreover, to adjust the curriculum merely to current usage is to doom our educational system to a static condition wherein progress becomes impossible.

B. R. B.

Reviews and Abstracts

VIRGINIA EDUCATION COMMISSION. *Virginia public schools.* (Including the report of the Survey Staff.) Richmond, Va.: Everett Waddey Co., 1919. 400 pp.

Very businesslike is this report. Its precision of aim gives it a certain directness and point which is often lacking in surveys whose object is merely to find out something. Moreover, the survey is peculiar in other respects. In the first place, it is a state survey and, while the system is not among the largest, it is by no means small. In the second place, considering the bigness of the undertaking and the wide range of topics discussed, the survey report is brief—brief in a day when brevity of reporting is by no means common. In the third place, being a state report, its findings work over inevitably into recommended legislation, i.e., into provisions for specific improvements. In the fourth place, there is an entire absence of either animus or the effort to "get" somebody.

Despite the brevity of the report, an abstract of it would be too extensive. Moreover, the book, we are told, will be published shortly by a commercial house and will, therefore, be easily available. We feel inclined strongly to recommend it to students, nor should we be greatly surprised if professors of education should find parts of it—especially the financial parts—useful as required reading.

As an example of a good method in reporting, it seems to us that the book is distinctive. The main body of tabular material is thrown into the back of the volume; this device adds to the readability of the report. We beg, however, to suggest an added improvement, namely, that the reading matter should be complete in itself; in other words, that the reader should be conscious of no loss of essential detail. Thus, the text should not directly require the reader to consult the tables. It should form a consecutive whole, and the references to tables, like bibliographical citations, should be carried in footnotes.

The legal status of schools in Virginia is peculiar in that the constitution, instead of confining itself to general provisions, embodies many details. Accordingly, many of the survey recommendations require constitutional amendments. Some of these amendments were proposed by the 1918 assembly; others will have to come up for the first time this year. They must then be passed again in 1922 and submitted to the people.

Some of the important recommendations of the commission to the General Assembly—recommendations in almost complete agreement with the corresponding recommendations of the survey staff to the commission—are as follows: (1) that the state board of education be appointed by the governor, and that it select the state superintendent at large; (2) that division superintendents be elected by local school boards from a list of eligibles prepared by the state board of education; (3) that the district unit be abolished in favor of the county (city or town) unit; (4) that the state school fund be distributed as follows: an amount not to exceed 5 percent to be used as a special relief fund; of the remainder, one-third to be distributed on average or aggregate attendance, one-third on the number of teachers employed, and one-third according to the adequacy of the local support; (5) that an effective compulsory education law and a school term of nine months be provided; (6) that assessments be increased and equalized and the constitutional tax limit removed, the limit to be determined by the legislature; (7) that free textbooks be provided at state expense; (8) that teachers' salaries be increased and based on minimum professional qualifications, the state tax being increased from fourteen to twenty cents to provide a part of the necessary funds; (9) that, as to teacher-training, normal schools abolish high-school courses, train only elementary school teachers, and extend the professional course from two to three years; that training departments in high schools be abandoned; that state institutions of higher learning be operated all the year round on the four-quarter basis, with special provision by means of two six-week terms in the summer for public school teachers; (10) that vocational education, physical training and school hygiene, education of negroes, and thec onsolidation and improvement of rural schools be definitely organized.

The survey has not failed to provide for adequate financial support for the public school system as it would be constituted if these recommendations were enacted into law. We should not know where to turn to find a clearer statement of how to determine and provide the amount of money needed to operate a good school system.

The General Assembly of 1918 had appropriated $10,000 for the survey commission. Later it seemed advisable to create a division of tests and measurements. It was evident, however, that, in order to do anything at all adequate in applying educational and psychological tests throughout the state, a great deal more money would be needed than the survey had in hand. Fortunately, the General Education Board was induced to appropriate $12,500 for this purpose.

Accordingly, for the first time in a state survey an attempt was made to ascertain the character of the work of the schools by means of actual standardized tests.

The chapter devoted to the work of this division is entitled: "The Results of Instruction Measured." It is wholly inadequate; and the propriety of including it in the survey volume is doubtful, especially since a special report on this phase of the survey work is promised for later publication. We observe the rather curious, not to say crotchety, selection of tests. This display of originality, however, led to at least one fortunate result, namely, the inclusion of two intelligence tests in the list. This is the first large use in a survey of such tests. The results of these tests, if, in the forthcoming publication, they are properly related to the educational tests, will constitute an important improvement upon conventional methods of reporting.

It seems to us that the work of the Division of Tests and Measurements forms no integral part of the survey which the Assembly had in mind when it created the commission. The problem was distinctly a legislative one. What Virginia needs more

than anything else is permission to go ahead and mandatory laws which will cut away old prejudices. The decision to test the schools may have been a wise one from another point of view, but it seems to us to constitute an almost entirely separate project.

As to the rest of the report, it is, as we have intimated, unusually effective. It "gets across." Unless we are much mistaken, a large proportion of the commission's program will be enacted into law—this, of course, unless politics play an unusually powerful rôle. The price of $10,000 may well prove infinitesimal compared with the advantages.

B. R. B.

MANUEL, HERSCHEL T. *Talent in drawing*. (School and Home Education Monographs, No. 3.) Bloomington, Illinois: Public School Publishing Company, 1919. 152 pp.

This monograph reports a study of gifted children made in 1916–1917. It was subsidized by the General Education Board and was conducted under the direction of Professor G. M. Whipple. In this study two groups of important related problems were recognized, namely (1) those pertaining to pupils of high general ability, and (2) those pertaining to pupils of special ability. Dr. Manuel's book has to do with the second group of problems. Its scope is indicated by its subtitle: "An experimental study of the use of tests to discover special ability." Pupils of special ability are defined as those who "by endowment or by training are so equipped as to take special interest in, and to succeed extraordinarily well with, some one ability."

The present study proposes to consider a special ability (drawing) with reference to two problems:

1. What are the essential psychophysical characteristics of persons possessing talent in drawing?

2. How may the test method be used in the diagnosis of such talent?

Forty-five individual tests, mental and physical, which were more or less standardized, were used with nineteen subjects chosen for recognized talent in drawing. The subjects were distributed as follows: college or university, 5; secondary school, 8; elementary school, 6. Biographical and personal data were also collected. The test results are presented by means of the "psychograph" or "profile" showing graphically the performances of each subject in several tests as compared with standard performances. This method of representing the statistical data derived from psychological tests is especially useful for diagnostic purposes.

As to the first problem—the characteristics of those talented in drawing—the following abilities seem closely related to ability in drawing: Mentally to note a visual form and to reproduce it; to observe; to select from a complex visual situation the most representative and the most beautiful aspects; to remember visual forms; to manipulate them mentally; to control hand movements in accordance with visual percept or image; to invent—i.e., to bring together into new artistic combinations the elements of different visual experiences; to judge the beautiful in line, form, color, and composition; and to discriminate differences in color and in visual magnitude. Acuity of vision, interest in the act and products of drawing, and general intelligence are likewise characteristics of those talented in drawing.

As to the second problem—the diagnosis of talent in drawing—naturally tests of the foregoing abilities are the ones selected from the entire forty-five as having highest diagnostic value. These are described and references are given indicating

where they may be found. It is recommended that tests be arranged to ascertain not only the strength of an ability but also its improvability. The so-called "instructed-learning" method is therefore advised. Finally, the author notes that "the measurement of many different abilities not primarily related to drawing is necessary to the most effective educational and vocational use of measurement of ability in drawing."

While it has not been the purpose of the author in this study to prepare material and standards for the recommended tests, he promises a further contribution of this nature. His limitations due to lack of standards is evident throughout, but we trust the one who has made so thorough an investigation of this particular problem will shortly supply the supervisor and teacher of drawing with usable tests valuable in determining the particular talent.

J. ORIN POWERS

MURDOCH, KATHARINE. *The measurement of certain elements of hand sewing.* (Teachers College Contributions to Education, No. 103.) New York: Teachers College, Columbia University, 1919. 120 pp.

The scope of this monograph is well described by the following statement of the author:

"The specific tasks of this research are as follows:

1. To make a scale by means of which merit in certain forms of hand sewing may be measured.
2. To make an inventory and analysis of the faults found in children's sewing.
3. To determine the relative importance of various faults and of various stitches as indicators of general merit in sewing.
4. To determine the relative reliability of judgments concerning various faults and concerning various stitches.
5. To determine (a) the reliability of one or more samples of a child's sewing in evaluating her real ability in that kind of sewing; to determine (b) the number of samples of various stitches which would be required in order to have various degrees of probability that a child's real ability to execute that particular stitch was measured.
6. To determine the relative accuracy of competent persons, with varying degrees of knowledge about sewing and the teaching of sewing, as judges of sewing products.
7. To test the value of our sewing scale as a means of attaining greater exactitude in the grading of sewing products."

As a preliminary step in constructing the scale for measuring certain elements of hand sewing, samples of the hand sewing of 1,212 individuals were secured. These samples are called samplers. They were uniform as to material and kinds of stitches. In quality they ranged from the samplers contributed by 37 children who were in special classes for defectives or in institutions for the feeble-minded to samplers contributed by adults who were judged to be expert hand sewers. From these samples of hand sewing 15 samplers were finally selected, which, on the basis of the judgments of competent judges, range in quality from 0 to 16.4. The method of selection and of determining the scale values follows closely that originally used by Thorndike in the field of handwriting and drawing. Each unit "represents that amount of merit which

exists between the samplers when one is recognized as being of more value than the other by 75 per cent of competent judges and of less value than by the other 25 per cent of the judges." "Zero was arbitrarily defined as meaning the score to be given a sampler which could be recognized as an attempt to conform to the directions for the making of the sampler, but which had absolutely no merit as an example of the stitches indicated." On the basis of this definition of zero, 38 of the 80 judges said that the sampler finally chosen to represent zero, represented zero, 21 judges considered it better than zero, and 21 judges considered it worse than zero. This sampler was contributed by an imbecile boy "untrained in sewing who is particularly deficient in motor control and who suffers from serious eye trouble which often causes dizziness and nausea."

Each of the samplers contains five kinds of stitches: combination, running, overcasting, hemming, and backstitch. Half-tone reproductions have been made of the fifteen samplers chosen for the final scale. Three views are given of each sampler in such a way that all of the sewing is represented. Thus the final scale as made available for general use consists of half-tone reproductions of the fifteen samplers made in such a way that all of the sewing is clearly shown.

The construction of the scale was supplemented by the analysis of the faults in the stitches involved in these samples of hand sewing. The list of faults was finally reduced to 23 in number and the relation of these to general merit was studied. This work supplements the scale in a very significant way. It is particularly valuable in assisting in the interpretation of measures in terms of the pupil needs.

In the study of the reliability of the measures yielded by the scale there are two significant findings. When it was used to measure the quality of the hand sewing in completed articles such as aprons and bags, it was found that the measures assigned by different judges were less variable than when isolated hand sewing on samplers similar to those of which the scale was made was measured. This finding shows that it is feasible to use the scale in measuring the hand sewing done in making real things. The second finding was that judgments of different teachers, based upon the use of the scale, were found to be less variable and hence more accurate than judgments made without the scale, although only teachers from a single large high school were used in this experiment and were untrained in the use of the scale.

The most significant features of Miss Murdoch's work are the ways in which she has supplemented the usual scale derivation. The time is rapidly approaching, if it has not already arrived, when new measuring instruments will receive little consideration until scientific evidence concerning their usefulness is made available. Already it is being urged by some that each measuring instrument should be accompanied by a definite statement concerning its reliability and validity. Miss Murdoch is one of the first, if not the first, to accompany the account of the derivation of a scale with a statement of the reliability of the scores that are obtained by using it. Furthermore, as stated above she demonstrates that the scale can be successfully used in judging the hand sewing on completed articles of a rather complex nature.

The scale has yet to be standardized and there is not contained in the monograph sufficient directions to guide a teacher in using it. It is to be hoped that in making the scale itself available to teachers, detailed directions for using it as well as record sheets for the tabulating of the results will be provided.

W. S. M.

HENRY, THEODORE S. *Classroom problems in the education of gifted children.* (Nineteenth Yearbook of the National Society for the Study of Education.) Bloomington, Illinois: Public School Publishing Co., 1920. 125 pp.

For a long time there has been in this country some recognition of the necessity of meeting the needs of pupils of marked ability in such a way as to give them opportunity for more rapid advancement than that of the average pupil. The great and hitherto unsuspected individual differences revealed by the recent widespread application of mental and educational tests are fast pushing this subject to the forefront of attention.

In this monograph the National Society for the Study of Education has once more made an important and timely contribution to the science of education. The study is the report of the results of an experiment in which pupils selected on the basis of their excellence in school work were placed under special instruction. It includes a summary of the various schemes for flexible promotion which have been tried out in this country, and a description of the types of special classes that have been established for gifted pupils. In addition, there is a chapter on the methods of teaching which are especially adapted to the instruction of this class of children, and a bibliography covering the general field.

The number of pupils selected for the experiment which was carried out in one of the public schools of Urbana, Illinois, was thirty—fifteen from the fifth and fifteen from the sixth grade. The attempt was made to carry out the experiment under average conditions of schoolroom instruction. "Supervision, course of study, physical equipment of room and of building, instruction—none of these could be said to be above average." The remaining fifth- and sixth-grade pupils of the school were used throughout the experiment as a control group. The intelligence quotients of the members of the special school as measured by the Terman revision of the Binet-Simon Scale ranged from 99.3 to 146.6. It appears, therefore, that on the basis of these tests there were pupils in the special class who did not belong there. Indeed, if the author's recommendation were adopted that a minimal I. Q. of 115 be the standard for admission to such special classes, it would rule out fourteen of the thirty pupils of this special class. Notwithstanding this handicap the special class was able to do the work of two grades in one year, and seventeen pupils secured corresponding promotion at the end of the school year on the basis of the regular examinations. Almost all of the remaining pupils passed special examinations after review work during the summer and thus secured promotion. Educational tests given throughout the year showed that by May first the pupils had actually gained a year as measured by these scales.

The interpretation of the results of such an experiment is necessarily somewhat difficult. There is no way of determining to what extent the more rapid progress of these pupils is due to the special conditions under which they were placed rather than to their superior abilities. As the author points out, practically all the methods adapted to the instruction of the specially gifted are equally applicable in the teaching of the average pupil. It is difficult to say how much more rapid the advancement of the control group might have been if it had had the advantage of the same special attention, and especially if the same spur to ambition had been provided. The success of a large number of pupils of only average intelligence in gaining promotion seems to show that these factors were more important than the author believes.

EDWARD H. CAMERON

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News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

West Virginia University Bureau of Educational Research

One of the latest additions to the rapidly increasing group of state educational institutions which have established a bureau of educational research is West Virginia University. In a recent circular they announce the establishment of the bureau and give the prices of a number of educational tests and the addresses from which they can be obtained.

Department of Psychology and Educational Research at Los Angeles, California

In 1917 Dr. Albert Shiels, then superintendent of schools, recommended the establishment of two new departments. Accordingly a Division of Educational Research was established in charge of Mr. Robert H. Lane, who as a principal of one of the elementary schools had attracted attention. Also, a Division of Psychology was created and Dr. A. H. Sutherland was invited to begin some studies on types of children. In 1920 Mr. Robert H. Lane was elevated to an assistant superintendency and thereby rewarded for meritorious service.

During the past two years comments have not been lacking that the work of the divisions overlaps. It was therefore decided to bring the two divisions together under the temporary name of the Department of Psychology and Educational Research with Dr. A. H. Sutherland as director. The new department is to continue the functions previously served by both divisions. It will have charge of the giving and training teachers to give standardized educational tests and the collection and tabulation of statistical information. It will also have charge of the segregation of types of children and the direction of the special rooms for backward children.

An Experiment in Silent Reading

Mr. H. C. Daley, Survey Department, Highland Park, Michigan, sends the following tabulation of the results of giving Monroe's Standardized Silent Reading Test in the seventh and eighth grades. Form 3 was given on September 19, 1919, and Form 2 on January 28, 1920. "After the September testing pupils were reclassified into strong and weak sections in accordance with the results of the tests. In several cases capable pupils were transferred to a higher grade." This shifting would tend to reduce the standing of the groups. In spite of this, all groups show remarkable gains.

This use of two different forms of this test raises the question of the equivalence of the forms. Although the different forms were constructed so that they would yield

equivalent comprehension scores, a recent study of the different forms shows that this was not accomplished in all cases. However, the best data available at this time indicate that Forms 2 and 3 are equivalent for comprehension in the seventh and eighth grades. They are not equivalent with respect to rate. The rate scores on Form 2 may be expected to be fifteen to twenty words higher than on Form 3. Thus the non-equivalence of the two forms used probably accounts for a portion of the gain in rate but it does not account for any of the gain in comprehension.

Grade	No. of Children		Rate		Comprehension	
	Sept.	Jan.	Sept.	Jan.	Sept.	Jan.
Low seventh	252	205	102	118	21	27
High seventh	170	136	103	134	22	28
Low eighth	199	161	101	135	21	28
High eighth	156	285	104	124	24	28

Number of Pupils:	Low Seventh		High Seventh		Low Eighth		High Eighth	
	Sept.	Jan.	Sept.	Jan.	Sept.	Jan.	Sept.	Jan.
Above rate 130 words per minute	39	96	22	72	23	93	29	95
Below rate 75 words per minute	29	14	29	2	36	4	16	16
Above comprehension of 30	35	76	27	53	42	68	48	115
Below comprehension of 11	44	2	14	1	29	3	9	9

American Psychological Association

The twenty-eighth annual meeting of the American Psychological Association, held at Harvard University, December 29, 30, and 31, 1919 was attended by more than 150 workers in psychology and allied fields. Joint sessions were held with the American Anthropological Association and the American Association of Clinical Psychologists and provisions were made for inspection of the Massachusetts State School for Feeble-Minded, the Judge Baker Foundation, the Carnegie Nutrition Laboratory, McLean Hospital, the Psychopathic Hospital and other local institutions.

Shepherd I. Franz, Government Hospital for the Insane, Washington, D. C., was elected president of the Association for 1920; H. S. Langfeld, Harvard University, and W. V. Bingham, Carnegie Institute of Technology, were elected to the council. Chicago was elected for the convention in December, 1920. Twenty-seven new members were voted into the association and the deaths, during the year, of John Wallace Baird, Edward Cowles, and August Hoch were reported.

A committee consisting of Bird T. Baldwin, University of Iowa (Chairman); W. F. Dearborn, Harvard University; L. S. Hollingworth, Teachers College; B. Ruml,

The Scott Co., Philadelphia; and Helen T. Wooley, Vocational Bureau, Public Schools, Cincinnati, Ohio, were appointed to consider the legal and professional status of "clinical psychologists." The N.E.A. at its last meeting passed a resolution to the effect that the diagnosis and segregation of defective children should be in the hands of highly trained and certified psychologists only; a similar resolution being adopted by the Educational Conference held at Albany, N. Y., in May 1919. The committee listed above is now engaged in (1) determining the qualifications of a clinical psychologist and in suggesting means of establishing and promoting an adequate professional curriculum; (2) investigating the methods of legal certification now operating in the states; (3) compiling data on the legal aspects of clinical work—the acceptance of testimony of a psychologist in court, commitments, etc.; (4) drawing up plans whereby the American Psychological Association may issue certificates to "clinical psychologists" and (5) determining the qualifications for psychological workers in industry.

The program of the session gave 6 titles under general psychology, experimental psychology 16, intelligence tests, educational and clinical psychology 21, comparative psychology 2, social and religious psychology 3, and applied psychology 7. The pronounced development of the technic of trade testing, the thorough tryout of intelligence tests by their use on more than a million and a half recruits, bringing up the question of revision of older notions of median mental levels of unselected as well as psychoneurotic, foreign-born, colored and other individuals, the need of tests other than those of general intelligence for diagnosis of psychoneurotics, vocational aptitudes and retardation in schools, the need of systematic training and classification of workers in the rapidly growing field of clinical psychology and the use of individual and group tests in diagnosis and prognosis of ability in school functions, may be considered the main features of the meetings.

The papers were so numerous and so varied in content, that no attempt will be made here to allude more than briefly to those which bear closely upon educational topics.

The address of the retiring president, Walter Dill Scott, Northwestern University, on the topic "Changes in Some of Our Conceptions and Practises in Personnel" gave a survey of progress in educational theory and practice. Evolution along five lines was emphasized. (1) A history was given of changes in the concept of the amount and nature of individual differences from the older belief that peoples were originally much alike and that such differences as appeared were due to environmental factors to the present belief that individuals differ enormously in all traits and that such differences are largely innate. "The greatest achievement of the association has been the establishment of the fact of individual differences and its applications to education, politics, industry, and economics."

(2) The importance of reasoning as a factor in adjustments has been superseded by the consideration of instincts, emotions, and habits. The operation of instinctive trends as the spring of action and the sources of discontent in industrial life was illustrated by concrete cases. It is not the violation of the worker's logical processes that brings unrest and discontent so much as thwartings of his pride, his desire of social approval, of mastery, and his instinctive and emotional trends.

(3) Education in the schools or in the factory must take into account the unlearned forms of reaction to features of the environment and seek to so order the individual

and his environment that the desirable adjustments may be made. The work of the personal director in industry must be enlarged and his function must be that of providing the approved experiences so that desirable habits of response will be built up. Mere richness of content or training of general faculties will not suffice.

(4) Changes have taken place in the concept of man and his environment. A man is not the victim of his environment, he is not the master of it nor is his function that of subduing or opposing it. The two should evolve together. In industry, the man and his job are not opposed, nor does the concept of selecting the man to fit the job—finding a square peg for a square hole—adequately express the present point of view. The function of the personnel manager is the "creation of the worker in a working situation." The work must be arranged to satisfy the human wants of the worker and he should be set to the task most in harmony with his particular talents and interests. There must be a correlated improvement of the work and the workers.

(5) The last point led to a survey of the evolution of vocational guidance from the chance methods of superstition, guess, and incidental inclinations to the modern technic to mental, physical, and vocational tests, statistical methods and the like. "In the last century the productivity of the worker has been doubled by the activities of some 2,000 minds through changes in the material world. In the present century equally great increases in productivity may be expected through the adjustment of worker to the work."

Following are brief summaries of papers, presented in the various sessions, which may be of interest to workers in education.

A most valuable and practical method of evaluating school attainments in terms of mental ability is the result of studies by Rudolf Pintner of Ohio State University. A mental test alone is not sufficient to diagnose a child accurately; measures of school attainment based on both age and grade norms are needed. Two survey tests, one mental and one educational, were devised and applied to 1,500 cases. Percentile values are converted into a so-called "index" ranging from zero to one hundred. The median indices serve as a measure for the school. A high mental age with low educational index indicates deficiencies in instruction, whereas a close agreement between the two indices indicates efficiency in the school. In the same way different classes in the same school or different individuals in the same class may be compared, enabling one to correlate innate ability with possible attainment and to apply corrective measures when the need appears.

E. A. Doll, Princeton University, presented data obtained from intelligence tests of a million and a half army recruits and other subjects bearing upon the median mental age of adults, commonly assumed to be about 16 years for unselected groups. The Stanford-Binet median mental age equivalent of army recruits is 13 years; of negro and foreign-born recruits 10 years; of adult male state prisoners 13 years, the actual tests used in each case being the Army Alpha. Five hundred typical public school children examined by Alpha show no increase in median scores by age after 13, the same being true of juvenile delinquents, ages 16 to 30 years. From these data the suggestion was made that the median mental age level of native white adults is approximately 13 years. No attempt was made to determine the life age limit of mental growth, since, it was suggested, "emotional development, skill, acquisition, aptitudes and the like probably continue to develop indefinitely." The upper age limit of feeblemindedness is not coincident with the lower mental age limit of nor-

mality, since it appeared that the borderline zone for feeblemindedness may cover a range from mental age 7 to 13 years. The application of mental age or I. Q. as criterion of mental defect is specially limited in the case of individuals of 10 or more years chronological age. Data harmonizing with these results were presented by F. L. Wells of McLean Hospital. The median I. Q. (Stanford scale) of 102 cases of mental breakdown at McLean is 88 but I. Q.'s of 100 are frequent and I. Q.'s of 119 have been found in patients conspicuously incapable of self-maintenance. Only in organic psychoses does the breakdown regularly involve the ideational capacities with which the intelligence scales are concerned. Normal and even superior "intelligence" is very generally associated with grave judgment and conduct disorder. Intelligence scales measure essentially ability to deal with ideas, as distinct from ability to deal with things or with people. Psychotic breakdowns are essentially failures of adjustment to the social environment. The speaker emphasized the minor rôle of "intelligence" (ideational capacity) in mental balance, urging a conception of education as a discipline of character rather than knowledge.

With a few changes, the Binet tests were successfully employed by S. P. Hayes, Mt. Holyoke College, in measuring the intelligence of the blind. A modification of the Pressey group tests also gave high correlations with the Binet scores and abilities estimated by teachers. E. L. Woods, Wisconsin State Department of Public Instruction, reported on the use of the recently devised Virginia tests Alpha in group testing of intelligence of delinquent girls. J. B. Miner, Carnegie Institute of Technology, displayed a method of utilizing three-dimensional models for representing individual differences in complex abilities such as salesmanship. Certain relations not now taken care of in frequency tables, correlations, multiple regression, etc., can be displayed by such models.

L. W. Webb, Northwestern University, found the Pearson coefficient of correlation between rate of reading (Monroe Standardized Silent Reading Test) and the Army Alpha and Thurstone Tests A and B ranging from +0.47 to +0.59; comprehension of reading gave coefficients ranging from +0.48 to +0.69. Speed and comprehension of reading correlate +0.85. The speaker contended that these correlations show too large a dependence of the pencil and paper tests upon rapidity of comprehension in reading.

L. L. Thurstone, Carnegie Institute of Technology, found the cycle-omnibus form of intelligence test to be of great service in furnishing data for recommending candidates for admission to engineering colleges, in advising committees on scholarship in cases of delinquent students, and in giving vocational counsel. S. S. Colvin, of Brown University, reported a correlation of +0.60 between success in the Brown Intelligence Tests and the standing in college for the first two years. The Thorndike tests, first used in 1919, proved to be of great prognostic value and showed a high correlation with itself in repeated tests on the same subjects.

D. Mitchell, Pelman Institute, defined clinical psychology as a "professional practice" as contrasted with the "science" of laboratory psychology. Clinical psychology was again contrasted with "applied psychology" largely on grounds that the latter field may have no relation to the individual. Clinical psychology is the practise of determining mental states in order to prescribe kinds and methods of education, of detecting specific abilities and disabilities of vocational significance and the manipulation of emotional development for desirable social reactions. Dr. Augusta F.

Bronner, Judge Baker Foundation, emphasizing the function of clinical psychology as that of individual diagnosis, gave illustrations of the failure of general intelligence tests to betray significant variations in mental equipment. The necessity of devising tests for many specific abilities was urged. Florence Mateer, Bureau of Juvenile Research, has found that whereas the mental age or I. Q. are of little value in the detection of psychopathic conditions due to syphilis, a detailed account of the range of plus and minus scores, and more precise measures of the individual responses often give a reliable clue to either congenital or acquired syphilis. The same type of analysis generally differentiates the psychopathic from the non-psychopathic no matter what the mental age may be.

Tests devised to measure such functions as persistence, conscientiousness, application and emotional control are being applied to junior high-school and other students by S. L. Pressey of Indiana University. Correlations of results from these tests with general intelligence, health, and estimates of intelligence were presented. Mrs. L. W. Pressey, Indiana University, urged group testing of general intelligence in the primary school as a means of studying the effect of school training upon tests subsequently given. Data permitting comparisons of test findings on children of the laboring and professional classes, whites and negroes, etc., were presented. E. A. Kirkpatrick, Fitchburg State Normal School, believes that normal school pupils may be trained in fifteen hours to use the Binet tests in classifying pupils. Less time is required to handle group tests, but much more is needed to enable the student to score, tabulate and interpret the results. Daniel Starch, University of Wisconsin, found in data obtained from 1,000 first-year pupils, that approximately equal mental ability may exist with great differences in language ability. Correlations ranging from +0.25 to +0.28 between interest in college subjects and grades received in them were found by J. W. Bridges, Ohio State University. The correlation between interest and the subject's estimate of his ability in the courses was higher +0.50 to +0.59.

From data obtained in several extensive investigations cited by E. L. Thorndike, Teachers College, Columbia University, it appears that even experienced judges can not treat an individual as a compound of separate qualities, such as intelligence, industry, technical skill, reliability, etc., and to assign a magnitude to each of these in independence of the others. The correlations between such traits are too high and too even, the ratings being apparently affected by a marked tendency to think of the person in general as rather good or rather inferior and to be influenced in all judgments by this general attitude. It was suggested that observers should report *the evidence*, not a rating, and that the ratings should be given on the evidence for each quality separately.

E. G. Boring, of Clark University, offered several cautions concerning the uncritical acceptance of the distribution of mental traits according to the normal probability curve. The form of the distribution depends, for one thing, upon the unit of measurement adopted. If the normal law, moreover, is the law of chance, then two mutually dependent variables for which the relationship is not simply linear, such as height and volume which varies roughly as its cube, cannot have the same form of chance distribution. If the distribution for height is normal, the distribution for volume cannot possibly be.

W. T. Shepherd, Washington, D. C., in a study of 148 children, ages eight to thirteen years, emphasized the importance of the educational and social experiences, the influence of respected teachers or friends upon the development of religious ideals.

The prevalent belief that our judgments in the fields of appreciation of music or literature as well as in morals are considerably influenced by the contrary opinions of the majority of experts in these fields is supported by experimental data obtained from college students by H. T. Moore of Dartmouth College. Comparisons with control groups yield results showing that the knowledge of contrary opinions of the expert or the majority produces reversals of individual opinions in matter of speech amounting to four or five times mere chance. Moral reversals under majority influence are 4.7 times chance whereas reversals of musical preferences as a result of expert or majority opinion is about twice chance.

ARTHUR I. GATES
Teachers College, Columbia University

A State-Wide Use of Educational Tests

The State Department of Education of Colorado recently decided to have given in all schools of the state the following standardized tests:

Courtis Standard Research Tests in Arithmetic, Series B, Gray's Oral Reading Test, Gray's Silent Reading Test, Ayres Spelling Scale, Ayres Handwriting Scale, "Gettysburg Edition."

At the present time the University of Colorado at Boulder, the State Teachers College at Greeley, and the State Normal School at Gunnison, are co-operating in conducting extension classes for Colorado teachers. For the western district of the state this work is in charge of Mr. O. B. Staples assisted by Dr. H. T. Manuel and Miss Stella Yowell. Mr. Staples writes as follows:

"The County Superintendents have been asked to direct this work (the testing program), and while they are struggling with it, those in my territory are quite unfamiliar with the technique of the work, and many of the teachers scarcely comprehend the significance of it, some of them not so much as ever having heard before of a "Standard Test." But this action of the State Department has given the work large publicity, and Dr. Manuel and I are cooperating with the people in our territory, meeting them in groups, singly, etc., giving them such instruction, encouragement, etc., as we can to help them "put over" the program of the State Department, although we think it is being attempted in a very crude manner, and I fear somewhat the results may not be very helpful for a time. However, it is a start, and will doubtless lead to something definite later.

"In our course we are using Monroe's *Measuring the Results of Teaching* as a text, and for the most part giving to the teachers themselves most of the tests discussed in this book. When the teachers seem familiar with a given test and the use of it, we have them give it in their schools and then we secure their results, discuss them, and ask them to apply whatever suggestions we together may derive from such procedure."

The state normal school at Gunnison has established a School Service Bureau which is serving the county superintendents and teachers of the state by supplying them with the testing material. In doing so, this normal school is following a practice which has been found exceedingly worth while in other states.

National Association of Directors of Educational Research

(E. J. Ashbaugh, *Secretary and Editor*)

Recently in talking with a gentleman who is greatly interested in the problems of educational research, he ventured the suggestion that most of our bureaus of educational research were misnamed. He stated that he thought they should be named bureaus of accounting, since the work which was being done was almost, if not entirely, of an accounting nature rather than research.

We wonder if the statement is true and if there is not a suggestion contained therein which will be beneficial to the members of our organization. Let each director of an organized bureau of educational research mentally review his work during the past year and consider whether or not it has been research or merely accounting. Has *status* alone been revealed? Have data been gathered, tabulated, and presented without careful analysis of the causal factors and the setting up of a definite remedial program?

We feel that the work of bureaus of educational research is most vital. We believe that the opportunities are practically limitless. We believe, also, that the present is critical and that the future of the movement for organized bureaus rests in the hands of those who are now directing such work. A few cities have established such bureaus and discontinued them because the school administration did not feel that the benefits derived were sufficient to justify their continuance. At this stage of the development of the movement such failure is almost a calamity. Superintendents and teachers may fail and the schools will continue. The educational world is accustomed to such failures. But we must not fail. We must not only discover status but also must reveal tendencies and causes. We must offer to the classroom teacher and the supervisory force definite constructive help in the solution of the problems which are revealed by measurement. We must offer the administrators well-conceived programs based upon definite data which can be presented to school boards and the public. We must keep the scientific attitude but speak in terms of common knowledge. We must attack minute problems and carefully control conditions in our experiments, but keep ever in mind that teachers and the public want results in terms of the larger educational progress.

Unless bureaus of research can modify practice; unless they can offer constructive help all along the line; unless they can make teachers, supervisors, and administrators feel that their work is indispensable, they will fail.

But we shall not fail.

The applications for membership of four persons are before the executive committee at this writing and others are going through the preliminary stage. Interest in the work of the association is certainly growing. Does any member know of a bureau anywhere which is not represented by membership? If so, he will please write to the secretary at once.

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